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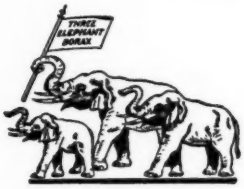

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Better Crops with PLANT FOOD

The Whole Truth—Not Selected Truth

R. H. STINCHFIELD, *Editor*

Editorial Office: 1155 16th Street, N. W., Washington 6, D. C.

VOLUME XXXII NO. 2

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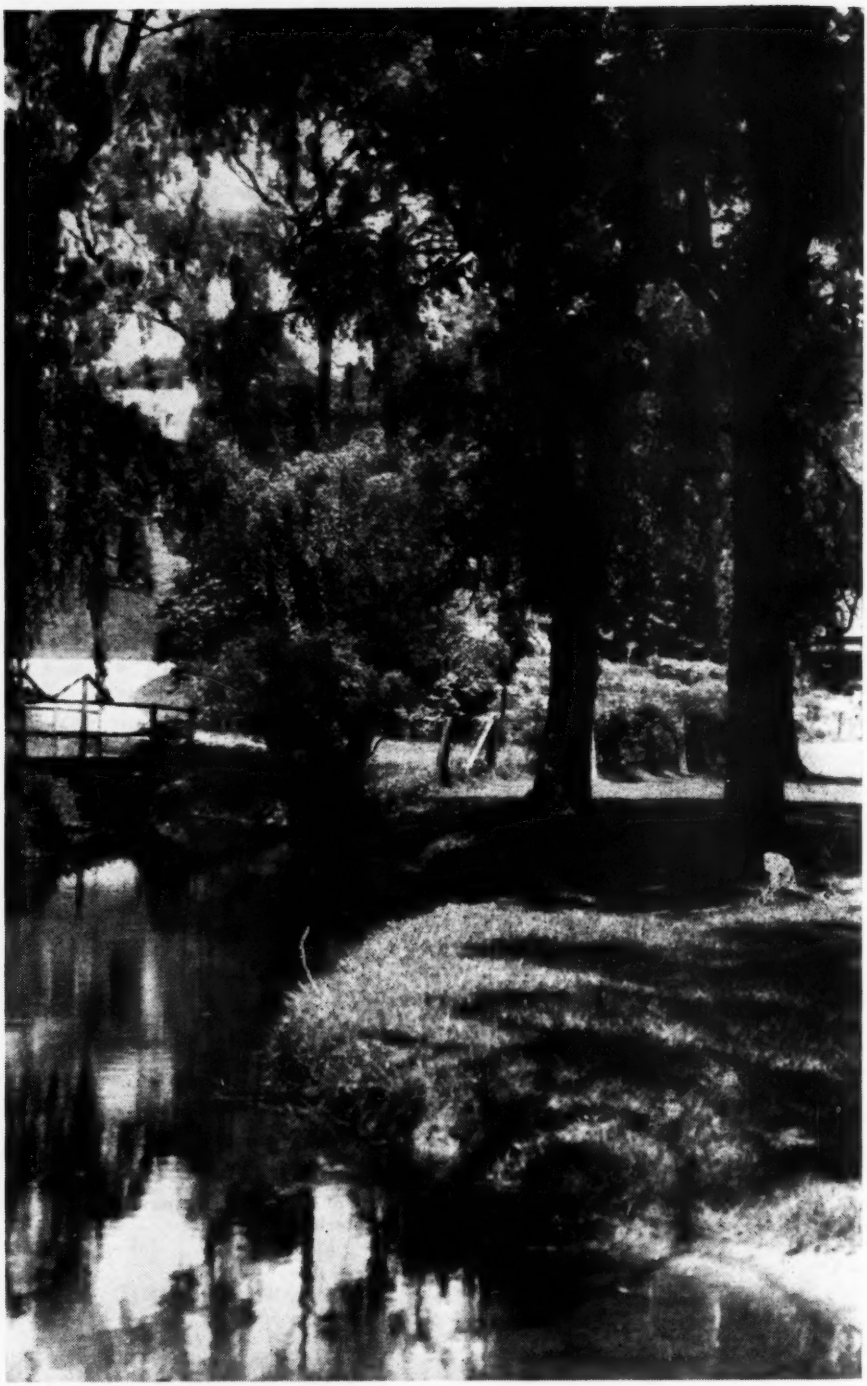

TO REVIVE OUR MEMORIES OF PLEASANT WEATHER

Better Crops with PLANT FOOD

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VOL. XXXII WASHINGTON, D. C., FEBRUARY 1948 No. 2

A Boost for . . . . . .

Our Honest "Grafters"

Jeff McDermid

EVER since the original fruit-growing firm of Adam & Eve was banished from Eden, the ancient craft of horticulture has been marked by fanatical zeal for pioneering, persistent cooperative effort, and the ultimate triumph of man over pests and other persecutions. Moreover, as I have observed them, horticultural leaders have usually been humble and modest men, but with a record of achievements that put them in the foremost ranks of American agricultural statesmen. In short, the orchard prophets of our land are our only tribe of honest grafters. It is therefore high time we trailed them down and gave them their just dues.

It is a logical time to indulge in this "exposé" of grafters, for this is the year when the American Pomological Society observes 100 years of organized fruit culture in the United States. In connection with this noteworthy event no less a vivid entertainer than Walt Disney will release a colorful animated cartoon in praise of John Chapman, otherwise known to many generations as Johnny Appleseed.

Manifestly it would be reckless indeed to attempt any suitable tribute or commentary on the lives and contributions of the host of horticultural wizards and zealots whose combined unselfish zeal provides us with such a marvelous heritage in world fruit production. Indeed so well have they labored and their recipes been adopted that some sections of the great fruit industry today have faces as red as their

apples, trying to get outlets for all the orchards' yield.

Tempted as I am to regale you with the claims put forth anon in my own bailiwick by provincial wonder-berry growers for a permanent niche in the succulent hall of fame, I refrain from pushing too far into the debatable realm when mentioning the most distinguished of American horticulturists.

It is quite true that I know two elderly and lovable men in my native state who fought dismay and decay and derision for a long period and came forth at last with new varieties of fruit that have since become standard commercial goods. Yet theirs is only a local achievement, quite easily matched by your own community. For wherever the sun shines and men love outdoor work and keenly relish dabbling in nature's laboratory, there are ample records of many such selections and improvements to swell the largesse of our rural cornucopia.

AVOIDING such quibbling, I turn to current professional opinion in seeking to display a fairly representative grouping of notables in the culture of vine and fig tree. One such set, which must suffice for want of further space, includes the pronounced trio of outstanding American horticulturists and an appended list of the winners of the coveted Wilder medal—itself a cornerstone of the American Pomological Society.

This premier trio, according to current data, consists of Liberty Hyde Bailey of New York and jungle explorations, aged 90 years and still young; William Henry Chandler, Missouri's contribution to the wondrous fruit world of California; and Ezra Jacob Kraus, Professor of Botany at Chicago University, native Michigander. The prodigious outpourings of lore that have made Bailey's name a household word wherever horticultural references are wanted seem to put him at the head of the list—plus his refusal to rest on past honors, choosing to roam in the fastnesses of South America instead of relaxing at the speakers' table when the APS meets in St. Louis this month.

WHILE the Wilder medal awards to noteworthy new fruits and to institutional exhibits are numerous, the awards to individuals number only 13, according to *The American Fruit Grower*. This list includes Marshall P. Wilder, founder of APS; Thomas P. James, its treasurer for 27 years; Patrick Barry; Robert Manning; W. J. Beal; Roland Morrill; William Armstrong; L. H. Bailey; U. P. Hedrick of Geneva; W. T. Macoun; N. E. Hansen, plant explorer; and Maurice A. Blake, peach improver.

Medals for achievement have likewise gone to state experiment stations, including those at Geneva, New York; New Brunswick, New Jersey; University Farm, Minnesota; Ames, Iowa; and the Central Experimental Farms, Ottawa, Canada.

Sixteen horticulturists have held the chair and presided over the APS in the century which ends this month. This roster of the dead and living includes Mr. Wilder, W. D. Brinckle, Pennsylvania; P. J. Berckmans, Georgia; Charles L. Watrous, Iowa; J. H. Hale, Connecticut; L. A. Goodman, Missouri; W. H. Hutt, North Carolina; L. H. Bailey, New York; Paul C. Stark, Missouri; R. W. Rees, Massachusetts; J. C. Blair, Illinois; B. S. Pickett, Iowa; T. J. Talbert, Missouri; and Stanley Johnson, Michigan, present head.

Looking back through certain years wherein mass production has been the keynote and commercial enterprise the basic urge in agriculture, the writer as an observer and recorder cannot avoid noting that for a time the ambitious farm orchards suffered woeful neglect. They were planted by men from eastern states with zeal for proficient fruit culture, but with the advent of livestock and cereal crop production at the turn of the century our poor old gnarly farm orchards became

witless prey to codling moth, canker, and fire-blight. A farm editor seldom used much time or space to defend them because of the numerous cattle auctions, pedigree fairs, and alfalfa sessions which took the spotlight.

Meanwhile the APS and the various state horticultural researchers went plugging along. I recall how small and repetitious were the conclaves of the state fruit growers' society, a handful of energetic and hopeful men striving to be heard in a raucous realm of drovers and auctioneers, and overshadowed by "general farming" and

protein pressure. Indifferent farmers insisted that their livestock have enough succulence via the silo, but forgot that their kids also needed it from the tree and the vine—plus vitamins.

I verily believe that considerable credit should go to the horticultural devotees who stuck by their (spray) guns during all this campaign of unbalanced agriculture—an agriculture unbalanced because it neglected the proper cultivation of suitable fruits on general farms. It was in the same careless way that the livestock gentry neglected pastures. Pastures, they thought, were just a gift of nature.

I discern a gradual change. It began a few years ago when cooperative orchard spraying rings began to operate and when successful farmers set up roadside fruit stands. Nurserymen and colleges played a part also in the education and reformation of the general farmer, but probably the chief instrument was the breeding of new hardy varieties of high yield, along with the banishment of the bugs by skillful scientists.

OF probably less influence, but worth noting just the same, were the receipts by express of gorgeous looking apples from the far-off professional zones. Local growers got mad and did some real vowing and vumming, while non-growing farmers got watery mouths and wanted to grow their own and save money.

The scarcity of fresh fruit on farms was fully known to the founders of the APS. In 1885 at the twentieth annual convention of the society at Grand Rapids, Michigan, President Wilder stated:

"When we think of what has been accomplished in the short history of the society, and think of the immense territory in our favored land yet to be occupied with fruit culture, and of the increasing demand for these products so necessary for the health and happiness of life, we feel the great responsibility which rests on us as protectors and conservators of one of the most important branches of American husbandry. Let me urge upon you to persevere in this work and preserve our bond of union throughout the land. Next to saving the soul is the saving of health, and I know of no better means than an abundant supply of fruit."

In that same "sermon," Mr. Wilder ended with a peroration to the harvests of Pomona, Italian goddess of the vine and the orchard. He said: "Fruits are the overflow of nature's bounty; gems from the skies which are dropped down to beautify the earth, charm the

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Root Rot of Sweet Clover Reduced by Soil Fertility

By W. A. Albrecht and A. W. Klemme[1]

College of Agriculture, University of Missouri, Columbia, Missouri

ROOT rot was prevalent in Missouri on numerous fields of second-year sweet clover during the cool, wet springs of 1946 and 1947. This "disease" was also observed on some of the sweet clover plots under fertility control in the four-year rotation of corn, oats, wheat, and sweet clover on the South Farm of the Missouri Experiment Station. Other adjacent plots on the Farm made normal growth and were apparently not infected.

Various investigators have reported that different plants growing on potassium-deficient soils are distinctly susceptible to root rot. Ginsburg[2] reported that soybeans suffering a potash deficiency develop very few lateral roots and those are only near the root base. These roots decay easily. According to Eckstein, Bruno, and Turrentine[3] potassium deficiency has a greater influence on the root development of biennial and perennial plants than on annuals.

Close observations were made in 1947 of the sweet clover on the plots at the Missouri Agricultural Experiment Station in order to ascertain whether there was any correlation between the levels of the soil fertility and the susceptibility of the sweet clover to this condition often spoken of as the "disease" of root rot. An attempt was also made to determine the effects of the "disease" on the growth of the plant and on the production of nitrogen within the crop.

The plots on the South Farm of the University of Missouri where the sweet clover was studied have been in the above rotation since 1938. The soil is a Putnam silt loam, typical of the clay-pan soils of Northeast Missouri where the "disease" was reported most prevalent.

Previous Soil Treatments Represented

A highly pure calcium carbonate limestone of ten-mesh, mill-run fineness had been applied to all plots at the rate of two tons per acre. On other plots additional treatments of phosphate alone or this in combination with potash had been made. The plots and the soil treatments used in these more careful observations and study were as follows:

Plot I—Limestone—2 tons each eight years.

Plot II—Limestone—2 tons each eight years plus 425 pounds of 20 per cent superphosphate in each rotation.

Plot III—Limestone—2 tons each eight years plus 425 pounds of 0-20-20 in each rotation.

The phosphate and the phosphate with the potash were applied as follows: 150 pounds in the row with the corn; 150 pounds drilled with the wheat, and 125 pounds drilled with oats. All crop residues were left on the land.

It was easily observed that the sweet clover on the plots receiving only lime-

[1] Chairman of Department and Extension Professor of Soils respectively, Univ. of Mo., College of Agri.

[2] Ginsburg, Joseph M., Soil Science, 1925, 20 pp. 1-13. Composition and Appearance of Soybean Plants Grown in Cultural Solution Each Lacking a Different Essential Element.

[3] Eckstein, Oskar; Bruno, Albert; Turrentine, J. W., Potash Deficiency Symptoms, 1937, p. 36.

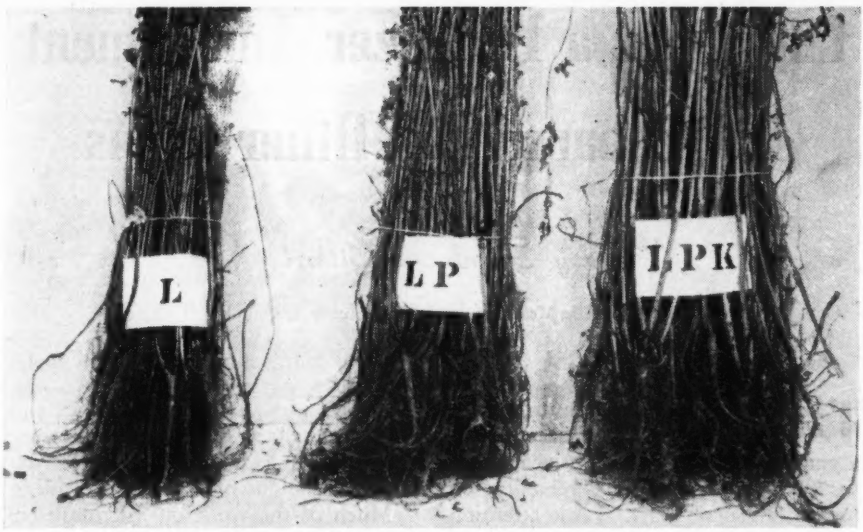

Fig. 1. Root rot infection varied from severe where limestone was used (left), to moderate where limestone and phosphate were used (center), to slight where limestone, phosphate, and potash were used (right).

stone was badly infested with root rot. Only the roots near the surface of the soil were alive. The others were dead and had partially or even fully decomposed. The plants growing on the plots which received both limestone and superphosphate were more deeply rooted. They had much more top growth than those growing on the plots receiving limestone alone. Those growing on the plot receiving lime and both phosphate and potash had more root growth and much more top growth. The differences in weights of plant parts, in nitrogen content, and in the root rot are shown in Table I. The plants growing where only limestone was used could be pulled up by hand. The plants growing on the other plots were deeply rooted and could only be removed with the help of a tile spade.

Yields and Nitrogen Content

Fractional samples of both roots and tops were harvested when in full bloom, air-dried, weighed, and the nitrogen content determined. These data are included with Table I.

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TABLE I.—HAY YIELDS, TOTAL NITROGEN, AND ROOT ROT OF SWEET CLOVER AS AFFECTED BY SOIL TREATMENTS

Treatments	Pounds Per Acre				Root Rot
	Roots	Tops	Total Plant	Nitrogen	
Limestone	2,072	2,864	4,936	80.0	Severe
Lime & Phosphate	3,428	5,594	9,022	162.0	Moderate
Increase over Limestone	1,356	2,730	4,086	82.0	—
Lime, Phosphate & Potash	3,644	7,570	11,214	240.4	Slight
Increase over Limestone	1,572	4,706	6,278	160.4	—

Copper as a Fertilizer Amendment For Tobacco and Other Crops

By Frank A. Gilbert

Battelle Memorial Institute, Columbus, Ohio

THE addition of micronutrients to fertilizer has not been accepted as a general practice, although local needs for such increments have been known for a number of years. Little attention ordinarily is paid to the value of micronutrient additions, except in cases where an element is so deficient as to cause visible symptoms in the plants grown. The result is that maximum growth is not obtained with many crops for lack of a pound or two of the required micronutrient which could be supplied at slight cost per acre.

Greenhouse and field plot tests have shown that the first slight indication of the need of a nutrient is demonstrated by a retardation of growth which occurs long before any visible symptoms are apparent. When "Sand Drown" makes its appearance on tobacco, applications of dolomitic limestone soon correct the trouble. Farmers are usually quick to correct the "yellowing" of an occasional field of alfalfa by the application of a few pounds of borax. "Exanthema" of citrus is soon remedied by an application of copper. However, in the thousands of cases where the deficiency is too slight to be readily visible, the costly amount of lost growth is not known.

Easily recognized copper deficiencies do not ordinarily make their appearance on most soils of the United States with the exception of regions in Florida, locations on the Coastal Plain, and some muck and peat areas in the Central States. However, applications of copper salts in areas other than these often bring a favorable response far above the slight cost of the treatment.

Much of the work on micronutrient deficiencies has been carried out in the greenhouse and on small plots, but very little research has been done on a large scale covering scores of farms. The Battelle Memorial Institute has since 1943, under the sponsorship of the Kennecott Copper Corporation, the Phelps-Dodge Corporation, and the Anaconda Copper Mining Company, conducted field tests on the value of copper as a soil amendment. These tests have been made up to 1947 on over a hundred farms in scattered locations in North and South Carolina, Virginia, Kentucky, Indiana, Ohio, West Virginia, and Illinois. Tobacco was the main crop used in the experiments but cotton, potatoes, soybeans, and garden vegetables were tried in some instances. The work is being continued on a widening scope but a progress report of the results to the present time seems appropriate.

It is realized that the results of these experiments in themselves are not sufficient evidence for the wholesale addition of copper or other micronutrients to all fertilizers to be used under all conditions, but they do indicate a trend and suggest that additional work along similar lines would be of value if our agriculture is to be brought to its maximum efficiency.

The cooperating farmers were care-

fully chosen for their integrity and their progressive method of farming and in most cases, were recommended by experiment stations or by their respective county agricultural agents. Most of the work was conducted on the better soils where, in the majority of cases, the yield of tobacco or other crops was far above the average for the state in which they were located. It was planned to conduct a few experiments on farms where the yield per acre was low, but the operators of such marginal farms could not be recommended for cooperative work and for the most part were unwilling to assume responsibility for such experimentation.

Most of the test plots were one-fourth of an acre, a few were less, and several were from one to three acres. All had equivalent control plots, but in a few cases, the crop on the test plot was compared with that on the remainder of the area and results from the entire non-tested area adjusted to the one-fourth acre equivalent. Insofar as possible, four treated rows were alternated with four untreated rows and the tobacco, or other crop, used for obtaining weight results taken from the two inner rows of both treatment and control. Sometimes, however, a direct comparison was made between two adjacent quarter-acre plots.

In crops other than tobacco, a direct weight comparison was made. In the case of tobacco, frequently the entire treated crop was weighed, but sometimes a number of representative sticks, usually fifty or one hundred, were graded and weighed and compared with an equal number from the control plot. Most of the cooperators sold the treated tobacco separately and thus obtained quality variations with resulting differences in price; but where this was not done, the average price for the entire crop had to be taken.

The results by states follow.

North Carolina

The value of copper sulfate as a soil amendment for tobacco on the Coastal Plain was brought to public attention by the work of Churchman and his associates in 1936.[2] Research on copper and other micronutrients was also conducted by Willis and Piland,[3] who demonstrated the value of copper sul-

Fig. 1. The effect of copper sulfate on yield of tobacco, Sampson County, N. C., 1945. The 50 sticks of treated tobacco to the right were from the two inner rows of a plot of one-fifth acre receiving copper sulfate at the rate of 25 lbs. per acre. The 50 sticks at the left were from the two inner rows of an adjacent one-fifth acre plot receiving no copper. Both plots received 200 lbs. of 3-9-6 fertilizer. The total weight of tobacco from the treated plot was 195 lbs. and from the untreated plot, 145 lbs., an increase of 50 lbs. or 34.5% for the treated tobacco.

fate to vegetable crops on acid peat soils around Wilmington. No extensive work on the problem was carried out, however, until the Battelle Memorial Institute, in 1943, started a number of cooperative experiments on tobacco and other crops, not only on the Coastal Plain but also in the Piedmont Section.

In that first year, five tobacco and two cotton experiments were set up with sufficiently advantageous results to show the need for more extensive work. One of the tobacco tests was discarded because of drought conditions which cut the crop to approximately 400 pounds per acre. However, three of the other four resulted in weight gains of from four per cent in Granville County to twenty-seven per cent in Sampson County. On one farm in Granville County, the treated crop on one-fourth acre gave 10 pounds less tobacco but sold for sufficiently more to return to the grower $16.34 over the price received for the untreated tobacco. Two cotton plots were treated in 1943, both in Sampson County. One of these showed no response to copper while the second gave a four per cent increase.

From 1944 to 1946, twenty-seven additional experiments were conducted on tobacco in eight counties with twenty-three positive results. Six of the twenty-three showed weight increases of less than five per cent, but the others varied from six per cent, on a farm in Pitt County, to thirty-five per cent on one farm in Sampson County. Ten of the increases were over fifteen per cent. At least three of the cooperators were so impressed with the results that the year following the experiments on their farms, they treated the remainder of their tobacco land with copper. In 1944, additional tests on potatoes and cotton on one-fourth acre plots gave increases of six per cent and five per cent, respectively.

South Carolina

Five tests were conducted on tobacco in South Carolina, two in Florence County in 1944 and three in Dillon County in 1946. The two experiments in Florence County resulted in seven per cent weight increases, and the other three in weight increases of two per cent, eighteen per cent, and nineteen per cent.

Virginia

Experiments were carried out in Virginia only in 1943, when one test was made on tobacco in Halifax, Lunenburg, and Mecklenburg Counties. The test in Halifax County yielded a weight increase of nine per cent, that in Mecklenburg County showed little response with a two per cent increase, while the test in Lunenburg County gave a decrease of two per cent in weight. In this County, however, there was an improvement in quality of two cents per pound, which returned a monetary increase of $3.71 for the one-third acre plot. The treated tobacco in Halifax County also was of better quality and commanded a premium of two cents per pound over the untreated.

Kentucky

The results of the application of copper sulfate to tobacco land in Kentucky are not so positive as in the Carolinas and Virginia. This is not unexpected when one considers the relative potential basic productivity of the land on which most of the tobacco is grown in this state. The large number of experiments in Kentucky is due to the fact that, in some cases, two were conducted simultaneously on the same farm using different applications of copper.

Thirty-three of the thirty-eight tests in 1945 and 1946 were conducted on seventeen farms in nine counties, and six were made through the courtesy of the experiment station at Lexington. Results varied considerably, and while most were positive, there were fewer large gains than in the Carolinas. Sixteen, or less than half of the gains, were over five per cent, and twenty-one showed little difference either positive or negative. Only two, however,

Fig. 2. Tobacco test plot on Mercer clay loam, Fayette County, Ky., 1947. The tobacco on the right received 20 lbs. of copper sulfate per acre in addition to the fertilizer; that on the left received only fertilizer. The treated plants grew less rapidly during the first few weeks after setting, but at the time this picture was taken, there was little difference between the treated and untreated crop. Fifty "treated" sticks (250 plants) from inner rows produced 64 lbs. of tobacco in contrast to 50 "untreated" sticks which produced 59 lbs., an increase of 35 lbs. for one-fourth acre or 8½%.

showed losses greater than five per cent that were not compensated for by an increase in quality of the leaf.

All of the six tests made on the grounds of the experiment station showed slight weight decreases, but on the other hand, in each of the six tests there was an increase in quality and the treated tobacco sold for more per pound than the untreated.

Indiana

Tests have been conducted for three years in two of the three tobacco-growing counties of Indiana. Results parallel those found in Kentucky.

Eight of the twelve tests were positive, and seven of these yielded weight increases greater than five per cent. Four tests showed a lower yield, but in only one of these was the decrease greater than three per cent.

Illinois

One test on soybeans was made at Mascoutah. Fifteen pounds of copper sulfate per acre were added to the fertilizer used on the test plot, and two one-thousand-foot rows each of both treated and untreated beans were harvested and weighed. The copper-treated beans showed a yield of approximately four and one-half bushels to the acre greater than those receiving only fertilizer. In addition, the copper-treated beans ripened somewhat earlier and the pods shattered less. This effect on ripening is not in accordance with most published reports which indicate that copper tends to delay ripening somewhat.

Ohio and West Virginia

No work was done in these states prior to 1947 and, inasmuch as tobacco is still being marketed as this is written, a complete report for that year can not be obtained in time for this paper. On the basis of a number of reports already submitted, however, it would appear that the results of the

(*Turn to page* 44)

Fig. 1. The pay-off of thick stands and plenty of fertilizer is shown by this picture of corn where the production was over 100 bushels per acre.

Swapping Plant Food for Corn

By W. R. Thompson

Extension Agronomist, Mississippi State College, State College, Mississippi

WILL it be 100 bushels or 15 bushels of corn per acre in Mississippi in 1948? This is a question for the farmers to answer. Many are producing 100 bushels now; but, many more are still producing only 15.

With the right amount of plant food and good cultivation practices, Mississippi farmers can more than double corn yields on the acreage now planted to corn.

Mississippi farmers plant an average of 2,400,000 acres to corn and produce 41,000,000 bushels with a value of $102,500,000. On this same acreage they could grow 72,000,000 bushels which would be worth $180,000,000 at current prices.

What is the secret to this increase in corn production? The answer is simple and is one every farmer can understand and put to use. It involves good land, a high-producing variety, and proper fertilizing, spacing, and cultivating. The cost of labor to grow and harvest an acre of corn making 15 bushels is about $14.83. To produce and harvest 30 bushels per acre costs about $16.86 in labor. It takes very little more labor to double the corn yield.

A good place to learn more about growing corn is on a farm where good practices are being demonstrated. In almost every county there are farmers and 4-H Club boys who are doubling their corn yields. Many of them are making 100 bushels and more to the acre.

Frank Harris, a 4-H Club boy from

Satartia in Yazoo County, raised 100 bushels of corn per acre on 5 acres this year. He planted Dixie 11, a Mississippi hybrid corn, and in addition to an application of high-grade complete fertilizer put 300 pounds of ammonium nitrate on each of the 5 acres.

In the Delta in Leflore County, W. H. Morgan made 106 bushels of corn to the acre. In Coahoma County both Billy Van Landingham and William McGregory produced 140 bushels to the acre.

William Osborn in Tishomingo County grew 183 bushels per acre, and in Lee County Douglas Robinson made 135 bushels, Roy Emfress 111 bushels, and W. T. Robinson 110 bushels to the acre.

For high yields of corn two practices —high fertilization and thick spacing— must be used together. There must be a balance between rate of fertilizer and plant stand. With high fertilization and thin stands, yields will be disappointing. With thick spacing and low fertilizer rates, the yield will be reduced. For example, H. W. Crosby, an Attala County farmer, made an average of 105 bushels per acre on 8½ acres of Dixie 11 corn. From 7½ acres of Tenn. 10 he made 84 bushels per acre. Mr. Crosby attributed this difference in yield to spacing. He used the same amount of fertilizer on both fields. The Dixie 11 field was spaced 16 inches apart in the drill. The other corn was spaced 2 feet apart before he had a chance to instruct the workers on proper thinning.

County agents have set up a 7-step corn program to double Mississippi's corn yield in 1948. Every county has a group of farmers who want to add some fun to the program, so they have organized themselves into "Mississippi's 100-bushel Corn Club."

These clubs are being sponsored by banks and civic organizations to lend color and interest to farm programs. They are for both juniors and adults. It won't be long before Dad may be able to beat his boy growing corn. In the meanwhile, they both get a big kick out of competing with each other.

Steps to Increase Corn Production

The steps to increase corn production in Mississippi include:

1. *Select good, rich land.* The best corn land is well drained and fertile. It is high in organic matter. Good hill land produces high yields.

2. *Prepare seed bed well*—in time for it to settle before planting. A well-prepared seed bed cuts down on cultivating later.

3. *Use enough fertilizer.* In the hills, hill bottoms, and Delta foothills of Mississippi, farmers should use 500 pounds of 6-8-8 or 5-10-5 fertilizer per acre when preparing seed bed.

If they do not use mixed fertilizer, in its place they should use 32 pounds of nitrogen at time of land preparation. Then, they need to side-dress with 32 pounds of nitrogen when the corn is

Fig. 2. Mississippi's champion 4-H corn grower in 1947 inspecting his acre which grew 183 bushels. This young grower says his father is beginning to grow high yields of corn, too.

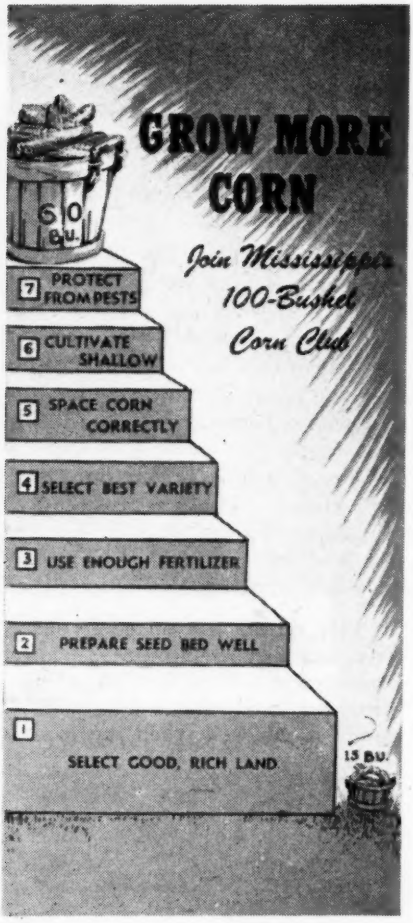

Fig. 3. The seven steps to growing 100 bushels of corn.

knee high. The recommendation for the Delta is 32 pounds of nitrogen at the time of seed bed preparation and side-dress with 64 pounds of nitrogen when corn is knee high. The nitrogen should be put 6 inches from the corn.

4. *Select the best variety*—for the area, either hybrid or open-pollinated. Plant in March or early April as soon as the soil warms up.

5. *Space corn correctly*—12 to 16 inches in bottoms and 16 to 18 inches on hills. Rows should be 40 inches wide.

6. *Cultivate shallow.* The land should be well cultivated before planting; after planting the cultivating should be shallow and the land left reasonably level. Shallow cultivation, often enough, will control weeds, but all cultivation should be stopped when corn is 2½ feet high. Rapidly growing, thickly spaced corn will shade out weeds and grass.

7. *Protect from pests.* Bad weather and weevils damage corn left in the field. Corn weevils begin their attack on corn out in the field. After it is gathered, store corn in rat-proof cribs and treat for weevils.

To protect corn after it is grown, the Extension entomologist has planned a weevil-treating campaign for 1948. This is very important, for weevils destroy 5 million of the 41 million bushels of corn produced in Mississippi. Rats, some of our closest neighbors, do a tremendous damage, destroying 6 million bushels of grain each year. The farmer accepted this fact until he found out something could be done about this loss.

The Extension entomologist and State Plant Board, along with the U. S. Fish and Wild Life Service and State Health Board, are putting on a war against rats in Mississippi during 1948.

The leading corn varieties for Mississippi include three open-pollinated varieties and six hybrids. On the list of open-pollinated varieties are Jellicorse, Neal Paymaster, and Station Mosby. The hybrids include Dixie 11, Dixie 17, Tenn. 10, Dixie 18, Funk G-714, and La. 468.

Jellicorse is a medium-hard, white prolific variety with a white cob and is adapted to the northern third of Mississippi. *Neal Paymaster* is a medium-soft, white prolific variety with a red cob and is also adapted to the northern third of Mississippi. *Station Mosby* is a medium-hard, white prolific variety adapted to the central two-thirds of Mississippi.

Dixie 11 is a white prolific hybrid with two or more medium to small ears per stalk. It outyields the better open-pollinated varieties by 10 to 25 per cent. It has a fairly long shuck which makes it more weevil-resistant than Station Mosby. The grain is medium hard. It is no better than Station Mosby in lodging resistance.

Dixie 17 is a white prolific hybrid adapted to areas of little weevil damage. It is similar to Tenn. 10 in adaptation, but has a little better shuck and, therefore, more weevil resistance. This is the highest yielding hybrid which is adapted to the Mid-South territory, and is commercially available. It is excellent for hogging off in all sections of the State. Only a small amount of seed is available for 1948 planting.

Tenn. 10 is a white prolific hybrid adapted to the northern third of Mississippi. It is the best of the old Neal Paymaster hybrids put out several years ago by the U. S. Department of Agriculture and the Tennessee Experiment Station.

Dixie 18 is a new, yellow hybrid released by the U. S. Department of Agriculture and the Tifton, Georgia, Experiment Station. This hybrid is adapted to the areas of heavy weevil infestation in South Mississippi. The grain is medium hard to hard, and the ear has an excellent long tight shuck. This hybrid stands much better than most open-pollinated varieties.

Funk G-714 is a yellow prolific hybrid sold for several years in the South. This hybrid has a fairly good shuck, but is subject to weevil damage in southern Mississippi. It has approximately the same area of adaptation as Dixie 11. Funk G-714 has little root lodging, but much stalk breaking if left until late to harvest.

La. 468 is a white prolific hybrid 75 per cent the same as Dixie 11. It will have slightly larger ears, but less weevil resistance than Dixie 11, and is adapted to the same area as Dixie 11 and Funk G-714.

The question, if Mississippi doubles corn yield, what will be done with the corn, is often asked. Since we are not a corn-selling state, it will be used for livestock feeding along with better rations for people.

Fig. 4. Steers fed by C. S. Whittington of Greenwood, Miss. Photographed by P. F. Newell, leader in Extension animal husbandry, just before they bade farewell to the feedlot of corn.

P. F. Newell, leader in Extension animal husbandry, says if enough corn could be produced, 100,000 native-produced steers should be fed out in Mississippi, using 25 bushels of corn per steer to finish them out when taken off good pasture. In addition to the steer feeding, 100,000 calves could be creep fed while running with the cow on pasture.

According to E. E. Grisson, associate Extension animal husbandman, Mississippi needs 250,000 more hogs finished to 225-pound weight to furnish the home needs, which would use 4,500,000 bushels of corn. Many farmers have learned that money can be made from hogs using home-grown corn if the yield is high. Willis Brown of Yazoo County, Mississippi, is getting 100 pounds of pork from 8 bushels of corn and fed out 500 hogs in 1947 by letting them graze corn and beans in the field.

Charlie Henry, also of Yazoo County, for 15 years has hogged off corn with 500 to 600 hogs per year. In 1946 Mr. Henry hogged off 250 acres of corn with 845 hogs and sold 86 head of cattle along with these hogs for $48,000. The hogs averaged 225 pounds and gathered their own corn.

Even though corn is Mississippi's oldest crop, some new things are being developed to boost production and make corn growing more attractive. A cheaper source of nitrogen is one of the big features of the corn production program. Dr. W. B. Andrews, the leader in the use of anhydrous ammonia, says that with cheaper nitrogen, more corn per acre is in sight.

The prices of 6-8-8 and 5-10-5 fertilizers have not gone up in proportion to corn prices, so a swap of fertilizer for corn is extremely profitable today.

Sometimes grass and weeds are enemies of growing corn. In the future there is hope that land fertilized, prepared well, and planted may be sprayed with 2,4-D so that weeds and grass won't show up.

Eighty-two counties in Mississippi are carrying on demonstrations in corn production using high rates of mixed fertilizer with extra nitrogen and close spacing. Since corn is grown on nearly every farm in Mississippi, there will be a bountiful grain harvest and corn show in 1948.

Fig. 5. G. F. Atkinson and County Agent C. W. Wright of Yazoo County looking over a bunch of hogs which have just finished hogging off 75-bushel-per-acre corn. The hogs are finished, too.

Fig. 1. Gerald (left) and Sandy Ross (right) look over some of the Netted Gem potato seed which they grew on their 160-acre farm at Pemberton, B. C. The Ross Brothers entered a sample of their seed potatoes at the Toronto Royal Winter Fair for the first time in 1947 and received the champion award. They plant 10 to 15 acres each year.

Canada's New Potato Champions

By Tom Leach

Canadian Broadcasting Company, New Westminster, British Columbia, Canada

WITHIN a period of 10 years two championship samples of Netted Gem potatoes have won the top award at the Royal Agricultural Winter Fair at Toronto. In 1937 John Decker of Pemberton, British Columbia, won the championship, and in 1947 Ross Brothers who farm 160 acres nearby won the same award. These growers and others farming in the Pemberton Valley have been consistent winners at seed potato shows in British Columbia. In the seed test plots conducted by the two western provinces of Canada and several western states at Oceanside, California, the samples sent from the Pemberton District have made remarkable showings.

It would appear that the regularity of success with potato seed which Pemberton growers have achieved should have some explanation. Haddon S. McLeod, Chief Potato Inspector in British Columbia for the Dominion Department of Agriculture Seed Certification Service, attributes their success to good foundation seed, early and frequent roguing of diseased plants, thorough spraying, and careful selection of the seed as to type and freedom from discoverable diseases. To that others will add the blessing of a good soil well isolated from other potato-growing areas and a willingness of all the farmers to stick to the production of only certified, foundation A, or foundation seed. By "foundation" seed is meant potatoes which in the field or

in the bin are virtually free from virus or other diseases affecting the potato. The regulations respecting this class of potatoes are enforced by Inspectors of the Dominion Government.

The Pemberton Valley is not extravagant in size, for it is only about a mile wide on the average and not more than 20 miles in length. Much of the land has been useless because of the meanderings of the Lillooet River, which comes streaking down from the glaciers at the top of the valley. On many occasions the river has been known to rise eight feet on a hot summer night, carrying logs and other debris to a bend, pile them up there, and then turn to a new channel where the process may be repeated two, three, or four years later. But the wanderings of the river had much to do with the deposition of silt over the floor of the valley and account for the excellent soil which may be found up and down its whole length. They also account for some of the difficulties encountered when attempts are made to clear the land for farming.

Ross Brothers, Potato Kings for 1947, started farming in the Pemberton Valley many years ago and have been on their present farm for 21 years. During that time they have seen their land flooded several times, but on most of its rampages the river has settled back rapidly enough to prevent any serious harm to the potato crop. Even in 1947 when the prize potatoes were grown, the crop was under water for almost two days. This proved simply a good irrigation for the crop, although the flood did leave behind another light layer of silt to add to the deep soil which has been built up over the years.

Clearing the land for farming presents an odd problem. In most cases the farmer has only to contend with surface growth, but that is not true in the Pemberton Valley. Once the surface is cleared and the land is ready for working, it is not unusual to find buried logs and stumps left years before by the twisting river. Sandy Ross, the elder brother in the Ross Brothers partnership, reports finding stumps with as many as three root systems, located two to three feet apart, and indicating that as the tree had grown a heavy deposit of glacial silt had been left over the area encouraging the tree to send out a new root system. Trees with two sets of roots were very common and still are being found by the engineers of the Prairie Farm Rehabilitation Act who now are developing a new and what they hope will be a permanent channel for the river so that the Pemberton Valley will be free of future flooding and will open up thousands of acres to new settlers.

Once the new channel is clear and functioning as expected, the farmers may be faced with a more complicated fertility problem than they have experienced in the past. Working with a relatively new soil they have not been worried with a shortage of even the major plant-food elements with the possible exception of nitrogen, and as for minor elements it is not likely they will

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Fig. 2. E. K. Hampson, Canadian Office, American Potash Institute, presented to Mr. and Mrs. Sandy Ross the gold watches which the Institute provided as a grand champion award for the best exhibit of potatoes in the show.

Fig. 1. Eroded hillside, Silas Creek Community, Ashe County, N. C., showing the results of cultivating steep land.

Soil Testing and Soil Conservation

By I. E. Miles and J. T. McLaurin *

North Carolina Department of Agriculture, Raleigh, North Carolina

MOST agricultural efforts are striving for maximum efficiency in production of good-quality food and feed. One approach to this task would be to stop, take time out to analyze the over-all situation, and work from that point. First, let's give some genuine thought to what we want to do or have. Next, where are we and what do we have at present? This calls for a thorough survey. Finally, last and most satisfying of all, comes the task of working out ways and means for accomplishing what we want to do. In order to proceed on this basis, there are a number of fundamental things to be considered.

* Ivan E. Miles, Director, Soil Testing Division, N. C. Dept. of Agriculture, Raleigh, N. C. J. T. McLaurin, Work Unit Conservationist, West Jefferson, N. C.

What Do We Want?

In this great country of ours, there is really no limit to what one can do and have if he is willing to pay the price. Assuming a good, sound, healthy body, without impairment, and an average, alert mind, one can apply oneself to almost any task, plan all of his efforts to that end, and he will get there. There will be temporary delays and possibly a few backward steps occasionally; but there is no doubt about the ultimate outcome.

Farming is a tremendous task. It affords just as many challenging tasks as any other profession. Let the farmer be as well trained in his field and use the same diligence and frugality of planning and application in his efforts and he will be just as successful as the chemist, the physicist, or who-have-you. To be a good livestock farmer, for instance, he must learn at least a few fundamentals of soils and their management. He must learn something of crops: their adaptations, the comparative values of different feeds, disease resistance, insect control, etc. He must learn livestock: breeds, their temperament, their needs as to feed, shelter, handling, and management. He must learn, whatever he does—whether farming or working in the chemical industries—to keep books upon himself. He must know where he stands at all times. If he is not progressing as fast as he should, he must locate and correct the cause. We in the agricultural field or I as a farmer must know what we really want if we are going to get very far.

Where Are We?

After we have decided what we want, the other steps follow logically. The second step is to take stock of what we have. The merchant does this regularly and in the most minute detail. The farmer's stock may be wide and varied, but all must be considered. The number and kind of livestock, houses, tractors, and other implements must be listed and valued. If there is an insufficiency of any of these things, they must be built or purchased in order to accomplish the immediate task at hand.

There is another phase of this survey, however, which may be even more important than these already mentioned: the soil must be considered. There are some types of soil upon which no man, however well he may apply himself, can succeed. It must be recognized that crops differ in what they demand of the soil. A soil

Fig. 2. Byron Sexton, Sturgill, N. C., and J. T. McLaurin, Work Unit Conservationist, study a soil capability map of Sexton's farm preparatory to drawing up conservation farm plan.

that produces 100 bushels of corn may be an absolute failure in alfalfa, regardless of treatment. We must first look at the soil in detail to see what is there.

Let us look at the texture of the top and subsoil, the depth of the topsoil, drainage, the organic matter, parent material, degree of weathering, etc. The fixing and holding power of a soil depends largely upon its texture and organic matter content. In general, the finer the texture, the more plant foods the soil will hold. This easily may mislead one if the other factors are not considered. Plant food is in much the same category as the livestock or tractor, in that it can be purchased. There are some characteristics of the soil, however, which cannot be easily and quickly—if, indeed, ever—corrected. For instance, poor drainage which is often associated with topography, fineness of texture, parent material, and degree of weathering may be impossible to correct. It requires considerable time to increase the organic matter content appreciably. The depth of the soil is very important to those crops that feed primarily from

the topsoil, and most of the crops grown in the southeastern part of the United States do. It requires a long time to increase the depth of topsoil appreciably.

Along with those factors mentioned above, which are often classified under the name of "soil type," this taking stock must show the degree of erosion and slope. As already pointed out, the depth of topsoil is of extreme importance. Even though the type of soil ordinarily might be suitable for a given crop, if the topsoil is washed away the possibilities of an immediate success on that particular soil are rather poor. In fact, over 100,000,000 acres of soil have washed away so badly that they are considered permanently lost from cultivation, and today from this cause there are still half a million acres being lost annually. These figures should be alarming to us, when we need maximum production as never before in history.

As the soils are found in this survey, one area may be capable of producing alfalfa and sweet clover, while another area would be a certain failure for these crops, but might grow soybeans very satisfactorily. This grouping of soils—based on the soil type, degree of erosion, slope, drainage, and adaptability—is grouping soils according to their capabilities, and a map showing this is called a "capability map." It includes not only those soils actually cultivated, but also those which should stay or be put back into forest. Farming without regard to the soil's adaptability, the crop's plant-food and cultural needs, and disease and insect control is the explanation for our present plight.

Even though enormous progress in crop yields has been made recently, certainly none of us are very happy with the average yield. Since we know something of how to increase yields, this point might be pursued further with profit. In 1935, North Carolina corn yields were 19 bushels per acre; and its cotton yield, 294 pounds of lint per acre. In 1947, corn yields were estimated to be 30.5 bushels; and cotton, 341 pounds. This is an increase in corn production of about 37 per cent; and in cotton, about 11 per cent in 12 years.

There is another, and perhaps just as important factor as yield; that is, quality. As far as quality is concerned, not a great deal is known; and much of that which is known is often not used.

How Are We Going to Get There?

After we have decided what we want, have made a survey, and know what we have, the next step is to plan how to get there. We probably will have a double objective at this point. The ultimate goal is always kept clearly in view, but we must decide what is to be done next. The priority of tasks may be quite important. What can and should be done this year, immediately, now?

At this point, let us recognize that there is a great deal of information and service available to the farmer that is not universally used. Using corn as an index, as indicated above in North Carolina, the average yields have been increased about 37 per cent in the last

Fig. 3. Collecting soil samples on D. C. Ray's farm, Ashe County, N. C.

12 years, which is good. However, where the capability map was used, that is, where corn was planted on adapted soil, fertilized properly, plowed correctly, and the disease and insects controlled, it has been proved over and over again that these 30 bushels easily could be doubled, with many farmers economically producing three and four times as much on a small-acreage basis. Cotton and many other crops are in much the same category as corn. When everything that is known about the crop was applied in connection with growing cotton, a great many farmers have grown two bales to the acre, with some few growing three bales. Cotton yields over the entire South could be doubled.

In the Blue Ridge Mountain area of North Carolina lies Ashe County, in which many farmers are using a great many of the known facts in regard to improving crop yields and are doing it with profit. Ashe County has an active Soil Conservation unit. All of the agricultural agencies in the County very effectively plan their work together, each doing its own task and complementing the other, thus giving a coordinated program in a very satisfactory, cooperative manner.

A capability map is made by personnel from the Soil Conservation District office. With this map the County Soil Conservationist, together with the farmer, plans a complete land-use program for every acre of land on that farm. Land which has been improperly used and has eroded badly, or for any other reason has given poor results, is put to a task that it can do. This replanning of the farm is basic in successful farming. The steep eroded areas, regardless of soil type, must be taken out of regular row-crop cultivation and put to a rotation that involves few row crops alternated with strip crops, or put to sod, hay crops, pasture, or trees. On the other hand, whatever is put on this land and on all of the other land must be adapted and fed in accordance with its own needs on the particular soil. This is the farmer's program; he helps make the plans.

It is interesting to note that one of the first questions asked by the farmer when the Conservationist begins to work with him is: "What does my

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Fig. 4. Land use under the conservation plan by Robert Edwards, Cabel Wilson, and Herman Hudson, Sparta Community, Alleghany County, N. C.

Fig. 1. Hogs grazing first-year alfalfa on E. L. Hood's farm, Marshall County, Alabama.

Success with Alfalfa in Alabama

By L. O. Brackeen

Agricultural Extension Service, Auburn, Alabama

WITHIN four years, Alabama's alfalfa acreage increased from 2,213 acres to more than 20,000. This outstanding increase can be traced to research findings of the Agricultural Experiment Station and numerous demonstrations sponsored by the Extension Service of the Alabama Polytechnic Institute. Demonstrations have been carried out by farmers over the entire state. In Jackson County, J. E. Carter, County Agent, reports an alfalfa demonstration under way in every community.

Records show that throughout Alabama, farmers are making three to five tons of alfalfa hay per acre. They are finding that alfalfa is a good grazing crop to supplement permanent pasture. Hogs when they graze alfalfa in addition to being fed some corn make good growth and economical gains.

J. C. Lowery, Alabama Extension Agronomist, says that very few farmers have failed in growing alfalfa when they followed recommendations of the Agricultural Experiment Station. He presents the following to show how farmers can succeed with alfalfa in most sections of the State:

Alfalfa should be planted on well-drained land which makes good yields of cotton and corn. Cotton is a good

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The New Frontier for Midwestern Farmers

By H. W. Ream

Soil Conservation Service, Milwaukee, Wisconsin

JUST a little over 100 years ago our pioneers were pushing westward to new horizons on the rich black prairie lands and rolling timbered slopes of the midwestern United States. A civilization with the highest standards of living in history was carved out of this wilderness of waving prairie grass and stately pines and hardwoods.

The gigantic industrial development which started shortly afterwards, and has continued at an increasing rate, was made possible largely because these productive lands supplied cheap food and raw materials at an abundant rate. In the process the land has been exploited and its resources wasted at a high rate. The desire to take care of land was not great when boundless areas of fertile soils remained unused. But today farmers can no longer move on to new acres.

The New Pioneer

A new kind of pioneer is rapidly supplanting the old. He is an individual who has come to the realization that land is his to use wisely; that if he will take care of the land, the land will take care of him. A new frontier is fast developing. Its future expansion means much to the nation and to the world.

No resource is more vital to the welfare of the American people today than the soils of eight midwestern states in the Upper Mississippi Valley. This island of fertility in the center of the North American hemisphere furnishes a half of America's families with all of their meat products, and from it comes 65% of the nation's butter and cheese.

The area comprising the States of Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin is the most important source of food and agricultural raw materials in the United States.

A look at some of the figures will substantiate this statement. This area includes only 15% of the land area and but 19% of the land in farms in the United States, yet in 1945 its cash receipts from farm operations were more than one-third of the total for the entire country. Cash receipts from farming in 1945 were $7,727,708,000 for these States out of a total of $23,694,611,000 for the entire United States.

Nearly 92% of the nation's soybeans, 84.5% of the oats, and 60% of the corn were produced here. Equally outstanding are the figures for livestock, poultry, and dairy production, which are shown in Figure 1.

Producing enough food to meet today's domestic demands and at the same time help feed the starving people of the world is placing a drain on our soil resources. Even more important to America's welfare, however, is a consideration of what effect the future might have on these resources.

Population experts forecast that by 1970 the people in the United States will number 30 million more than today. Our exports of agricultural products at the present time, while we are helping feed the world, are about 10% of our total production. This essentially means that if we maintain

production at present levels, and exported nothing, we could feed a population 10% greater than our present population.

Based on most recent estimates, our people number 145 million. We can, thus, support only an additional 14½ million people. And 15½ million people may have to "go begging" by 1970 unless our soils are maintained and their productive capacity increased, or unless our imports are stepped up. The latter is highly improbable since imports have been at an extremely high level during recent years and there is little prospect that these can be increased materially.

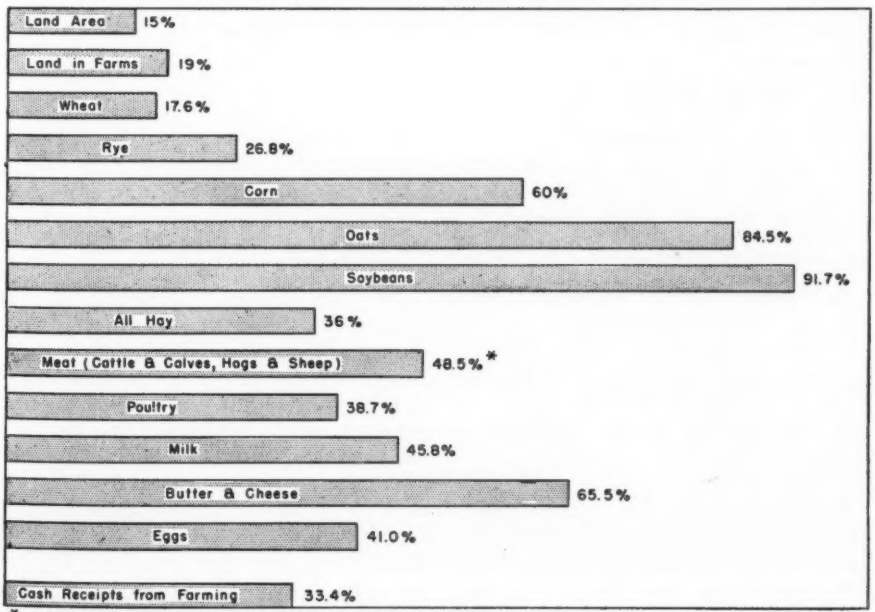
The plain facts are that we must start taking better care of our soils now. We must use the best possible soil-conserving methods and step up the productive capacity of the land to meet the needs of this expanding population. And farmers in these Upper Mississippi Valley States will have to bear the brunt of these demands.

The war years brought about a substantial increase in inter-tilled crops. Five of these midwestern states were responsible for 56% of the entire national increase. These were Indiana, Illinois, Iowa, Missouri, and Ohio. The farms of Michigan, Minnesota, and Wisconsin contributed more than a third of the remainder.

Farmers in these states had no choice in the matter; they had the only soil resources in the country that were still good enough to do the job quickly. This placed a tremendously heavy burden on already over-worked land, and many acres have been made unfit for further cultivation.

To meet this new future challenge of more American mouths to feed, farmers in this section must approach the problem from a different angle. We can no longer say "plow up more land" or "farm more acres." The solution, and the only logical one, is to produce more food per acre for years to come.

Figure 1 - PRODUCTION OF SOME PRINCIPAL AGRICULTURAL PRODUCTS IN UPPER MISSISSIPPI VALLEY STATES IN PERCENT OF UNITED STATES TOTAL IN 1945



* Weight of cattle and sheep shipped in for feeding deducted.

TABLE 1.—SOIL CONSERVATION PAYS

Average production and income of 252 soil-conserving farms and 251 farms without soil conservation—Upper Mississippi Valley Region, 1945

	252 soil-conserving farms	251 farms w/out soil conservation	Difference
Size of Farm—Acres	170.6	170.8	− 0.2
Yields of Crops—Per Acre			
Corn—bu.	50.9	44.3	+ 6.6
Soybeans—bu.	21.9	19.1	+ 2.8
Oats—bu.	52.4	48.5	+ 3.9
Wheat—bu.	22.0	18.7	+ 3.3
Hay—tons	2.01	1.99	+ 0.02
Livestock Production—Per Farm			
Cattle—lb.	9,458	7,054	+2,404
Sheep—lb.	666	600	+ 66
Hogs—lb.	13,462	10,882	+2,580
Poultry—lb.	845	725	+ 120
Eggs—doz.	1,779	1,521	+ 258
Milk—lb.	92,200	86,100	+6,100
Production Income*			
Per farm	$6,877	$5,923	+$ 954
Per acre	$ 40.31	$ 34.68	+$ 5.63

* This figure represents the value of the products produced on the farm at 1945 price levels, less feed purchases and the cost of conservation treatment.

Greater food production for years to come does not necessarily mean more bushels of corn or other crops right now. It implies a greater food supply in total for the immediate future and for generations to come. This means that soils must be conserved while this vast supply is being produced. But can this be done?

Conservation Farming the Solution

For an answer let's examine the results of a study of production and income records on 503 farms in Illinois, Indiana, Ohio, and Wisconsin. This study was made in 1945 by the U. S. Soil Conservation Service in cooperation with the State Agricultural Experiment Stations.

In making this study, farm economists selected farms which were comparable in size, having similar land use capabilities, and located in the same part of each state. Of the group, 252 are being operated under well-developed, complete farm conservation plans. On the remaining 251 farms, little or no soil conservation is being practiced.

Information on crop acreage, yields, and the amount of crop and livestock products sold and used in the home during the 1945 crop year was obtained from each farmer. Actual 1945 market prices were used in computing the income for both groups. Table 1 shows the comparison of the two groups of farms.

Corn yields were 6.6, soybeans 2.8, oats 3.9, and wheat 3.3 bushels more per acre on the soil-conserving farms. Considerably more beef, pork, poultry, milk, and eggs were marketed from these same farms. Conservation farming resulted in an average increase in income of $954 per farm or $5.63 per acre.

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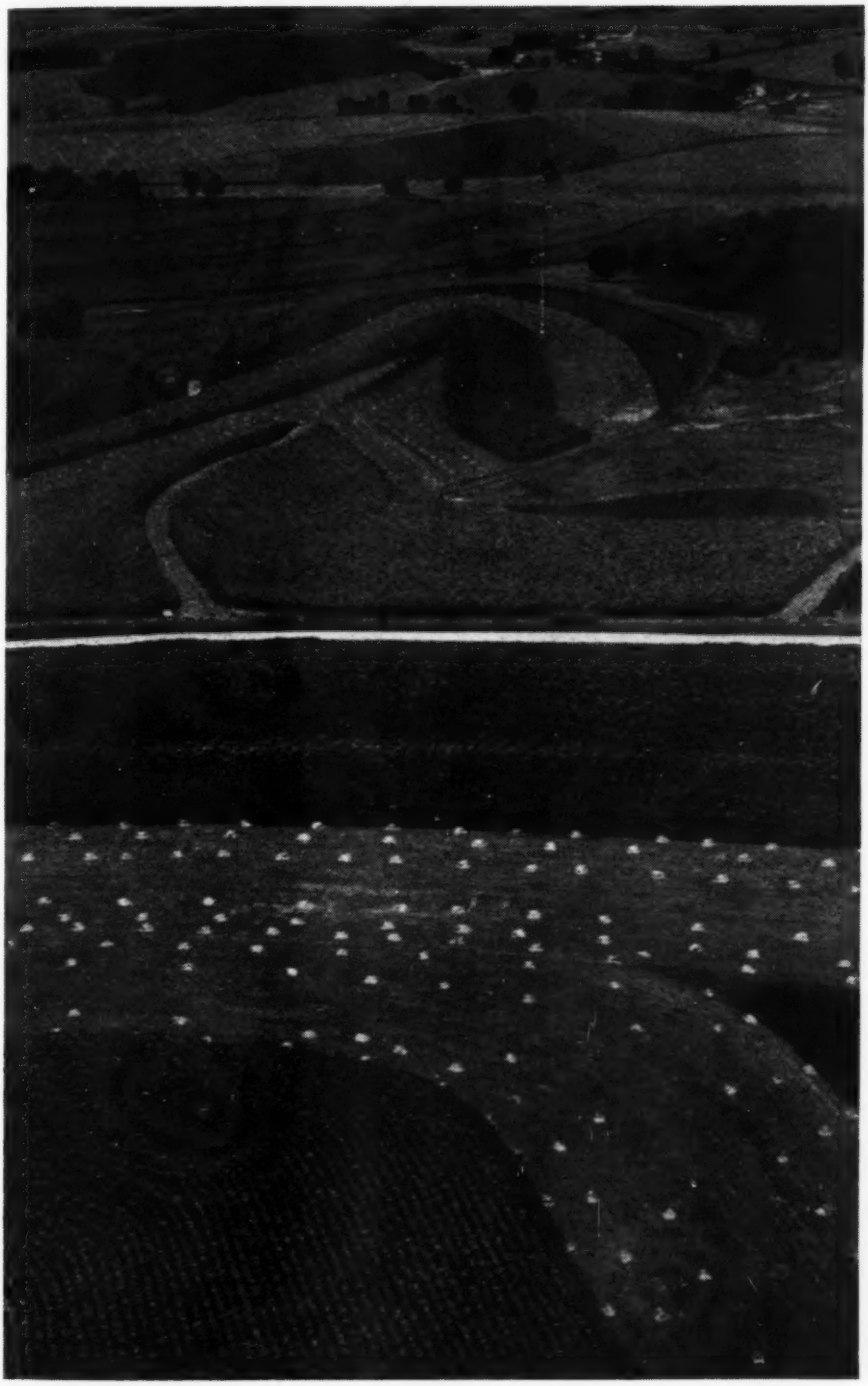
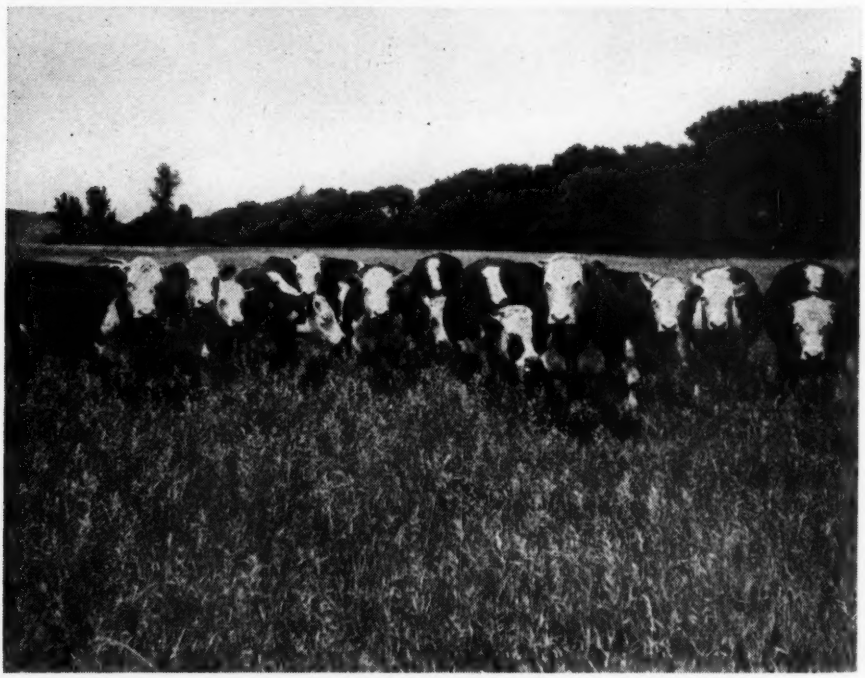


This aerial photo of the Farley Henkes farm near McGregor, Iowa, depicts the conservation practices which are a part of proper land use.

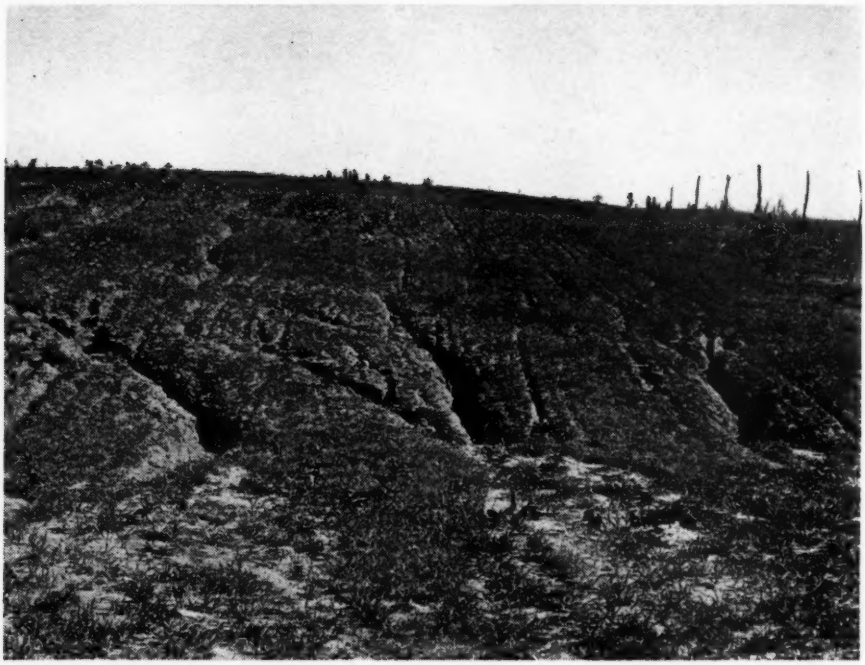
Lime applied to pastures and cropland is a key practice in rebuilding soil productivity.



Properly managed brome-alfalfa pastures help rebuild soil fertility and yield high returns in beef.

In addition to helping restore soil productivity, grass legume mixtures pay off in wool and mutton.

Hogs gain on brome-alfalfa which is a dependable crop in soil-building rotations.



Before and after pictures show how land badly damaged by improper land use can be reclaimed to profitable production and protected from further deterioration.

The Editors Talk

The Farm Problems of the Cotton Belt

Coming from all over the South and being joined by key men in the U. S. Department of Agriculture, the Association of Southern Agricultural Workers met in Washington, D. C., on February 12-14 in their 45th annual convention. The theme for the program was "Adjusting Southern Agriculture to Increase the Farm Income."

On the surface and in the face of present high farm prices, this purpose might seem a bit beside the point, but it is recognized that the fundamental farm problem of the Southern States is the low per capita income of their farmers. The Southern Workers in their convention did not mince words. They were present to find out what more they themselves could do to relieve the situation. The excellent address of the President of the Association, Dr. M. J. Funchess, Dean of the School of Agriculture and Director of the Agricultural Experiment Station, Alabama Polytechnic Institute, summed up what was in the minds of everybody and what went on in the various group sessions.

"The area of our country commonly known as the South has at one time or another been referred to as the Nation's Economic Problem No. 1 and the Nation's Opportunity No. 1," Dean Funchess said. "As of the moment, I think the South is the Economic Problem No. 1, but I do not think it needs to remain so if agricultural workers who serve the South fully understand what are some of the causes of the poor economic status of Southern farm people. . . . The relatively low farm income in the South can be increased if we really understand what our most important problems are, and especially our 'bottleneck' problems. The first essential is that we know where we are and the direction that we should go from there."

He then dwelt on the high labor requirement, low production per man hour, and low production per acre, carefully substantiating his remarks with comparative statistics. To drive home the importance of yield per acre he pointed out that in 1946 Iowa produced 135 million bushels more corn on 11 million acres than were made on over 30 million acres of the 13 Southern States. The yield in Iowa was 52.8 bushels per acre, while in Georgia it was only 13.2 bushels (1944-46 average).

Of commercial agriculture, he said, "In my opinion, Southern farmers never will be relatively as prosperous as those of other regions until there is developed a farm program for the commercial use of all the available land. If the 79 per cent of our low-income lands were all made to produce an income like the 21 per cent in cotton, tobacco, and peanuts, the four Southern States (Georgia, South Carolina, Alabama, and Mississippi) would not be considered as Economic Problem No. 1." He believes that mechanization of the whole farm program in the South is a "must" on the list of things to be done if competition is to be met. The greatest bottleneck in Southern agriculture will be broken if and when the cotton crop can be harvested by adapted machinery and cleaned and ginned on machines that are much more efficient than anything now available.

Coming back to the low farm income, Dean Funchess said that on a per capita

basis, the South produces too little to sell. The increased domestic need for cotton caused by the war and the high price per pound are all that kept the South from experiencing a period of economic crisis at a time when most other agricultural areas were experiencing unprecedented prosperity.

He does not disagree with those who stress the great need for more industries in the South, but thinks it is a disservice to the South to lead its citizens to believe that in the long pull there are many possibilities of reducing very materially the farm population of an agricultural state like Alabama. He cites the high birth rate and the excess of births over deaths in normal times.

As to the potential possibilities of raising the income of individual farms—there are many proofs that it can be done, stemming from practical farm operations carried on by experiment stations and by farmers who have learned how to use their land most efficiently. By way of example, Dean Funchess cited three Alabama experiments, the first on a 96-acre farm where in 10 years with cotton and hogs, two men using the best information from the Station increased the farm income from $1,799 to $11,282. On another production unit of 32.2 acres and using the same program, it was shown that after deducting cash costs a 6-year average of $2,112 could be obtained by one man with little hired or family help. In addition he would have his own meat, milk, and vegetables. On a milk production unit with 57 acres of improved pasture, 11 acres of corn, 5 acres of alfalfa, and 12 acres of kudzu involved, the value of the milk sold alone was nearly $11,000. This unit was handled by two men.

Therefore, Dean Funchess believes that the responsibility for the solution of the problems falls heavily on the Experiment Stations of the Southern States with the help of the U. S. Department of Agriculture. But after those in the research field have done the best possible job, there still remains the job of education. Just as the manufacturer must dispose of his product, so must the results of research work be taken to the consumer—the farmer. The educational work that needs to be done in the South now is much more complicated than it was when cotton was the chief cash crop. Each new enterprise calls for new information, and the adult teaching program must expand to keep pace with the expansion of the research program.

"For example," he said, "we now know that we may grow alfalfa on hundreds of thousands of acres of land where it was thought impossible 12 years ago. Just as soon as a farmer has a field of alfalfa, there develop questions about grazing that he never needed to think about before. Then may come worms or insects to try to destroy his crop. He must have information on these. All are new problems to him—and to all the agricultural workers who are trying to help him with his program. Likewise, if he adds hog or milk production to his farming program to consume this alfalfa and the other pasture, feed, and forage crops needed, think of the vast number of additional things the farmer must learn to do—and do well and on time! And, it goes without saying that the hired help engaged in assisting with the educational program must keep ahead of his farmer constituent. All of this points up to the fact that agricultural workers in the South have at once an almost unlimited opportunity and a corresponding responsibility. We all must feel our responsibility so keenly that we shall be determined not to fail Southern farmers in their time of greatest need."

This realistic approach to big problems is most healthy. Instead of patting themselves on the back for their already great accomplishments, the Southern Workers turned introspective. Such sincerity foretells a steady progress in the advancement of Southern agriculture. It could well be the keynote for the conventions of all agricultural research and advisory forces, whatever the group or area.

Season Average Prices Received by Farmers for Specified Commodities *

Crop Year	Cotton Cents per lb.	Tobacco Cents per lb.	Potatoes Cents per bu.	Sweet Potatoes Cents per bu.	Corn Cents per bu.	Wheat Cents per bu.	Hay Dollars per ton	Cottonseed Dollars per ton	Truck Crops
	Aug.-July	.....	July-June	July-June	Oct.-Sept.	July-June	July-June	July-June	....
Av. Aug. 1909–July 1914	12.4	10.0	69.7	87.8	64.2	88.4	11.87	22.55	....
1922	22.9	22.8	65.9	100.4	74.5	96.6	11.64	30.42	....
1923	28.7	19.0	92.5	120.6	82.5	92.6	13.08	41.23	....
1924	22.9	19.0	68.6	149.6	106.3	124.7	12.66	33.25	....
1925	19.6	16.8	170.5	165.1	69.9	143.7	12.77	31.59	....
1926	12.5	17.9	131.4	117.4	74.5	121.7	13.24	22.04	....
1927	20.2	20.7	101.9	109.0	85.0	119.0	10.29	34.83	....
1928	18.0	20.0	53.2	118.0	84.0	99.8	11.22	34.17	....
1929	16.8	18.3	131.6	117.1	79.9	103.6	10.90	30.92	....
1930	9.5	12.8	91.2	108.1	59.8	67.1	11.06	22.04	....
1931	5.7	8.2	46.0	72.6	32.0	39.0	8.69	8.97	....
1932	6.5	10.5	38.0	54.2	31.9	38.2	6.20	10.33	....
1933	10.2	13.0	82.4	69.4	52.2	74.4	8.09	12.88	....
1934	12.4	21.3	44.6	79.8	81.5	84.8	13.20	33.00	....
1935	11.1	18.4	59.3	70.3	65.5	83.2	7.52	30.54	....
1936	12.4	23.6	114.2	92.9	104.4	102.5	11.20	33.36	....
1937	8.4	20.4	52.9	82.0	51.8	96.2	8.74	19.51	....
1938	8.6	19.6	55.7	73.0	48.6	56.2	6.78	21.79	....
1939	9.1	15.4	69.7	74.9	56.8	69.1	7.94	21.17	....
1940	9.9	16.0	54.1	85.5	61.8	68.2	7.58	21.73	....
1941	17.0	26.4	80.7	94.0	75.1	94.5	9.67	47.65	....
1942	19.0	36.9	117.0	119.0	91.7	109.8	10.80	45.61	....
1943	19.9	40.5	131.0	204.0	112.0	136.0	14.80	52.10	....
1944	20.7	42.0	149.0	192.0	109.0	141.0	16.40	52.70	....
1945	21.2	36.6	143.0	204.0	127.0	150.0	15.10	51.10	....
1946	28.3	38.2	124.0	219.0	136.0	185.0	17.30	71.40	....
1947									
January	29.74	39.0	129.0	220.0	121.0	191.0	17.50	90.40	....
February	30.56	31.9	131.0	228.0	123.0	199.0	17.50	88.20	....
March	31.89	33.6	139.0	235.0	150.0	244.0	17.40	88.00	....
April	32.26	30.1	147.0	233.0	163.0	240.0	17.20	88.00	....
May	33.50	44.6	153.0	233.0	159.0	239.0	16.80	83.70	....
June	34.07	46.0	156.0	249.0	185.0	218.0	16.00	79.60	....
July	35.88	48.5	169.0	251.0	201.0	214.0	15.10	79.00	....
August	33.15	38.1	161.0	270.0	219.0	210.0	15.30	75.50	....
September	31.21	40.7	149.0	240.0	240.0	243.0	16.10	75.60	....
October	30.65	41.6	150.0	205.0	223.0	266.0	16.80	90.60	....
November	31.87	40.0	166.0	195.0	219.0	274.0	17.30	89.10	....
December	34.06	46.9	172.0	204.0	237.0	279.0	18.10	94.80	....
Index Numbers (Aug. 1909—July 1914 = 100)									
1922	185	228	95	114	116	109	98	135	....
1923	231	190	133	137	129	105	110	183	....
1924	185	190	98	170	166	141	107	147	143
1925	158	168	245	188	109	163	108	140	143
1926	101	179	189	134	116	138	112	98	139
1927	163	207	146	124	132	135	87	154	127
1928	145	200	76	134	131	113	95	152	154
1929	135	183	189	133	124	117	92	137	137
1930	77	128	131	123	93	76	93	98	129
1931	46	82	66	83	50	44	73	40	115
1932	52	105	55	62	50	43	52	46	102
1933	82	130	118	79	81	84	68	57	91
1934	100	213	64	91	127	96	111	146	95
1935	90	184	85	80	102	94	63	135	119
1936	100	236	164	106	163	116	94	148	104
1937	68	204	76	93	81	109	74	87	110
1938	69	196	80	83	76	64	57	97	88
1939	73	154	100	85	88	78	67	94	91
1940	80	160	78	97	96	77	64	96	111
1941	137	264	116	107	117	107	81	211	129
1942	153	369	168	136	143	124	91	202	163
1943	160	405	188	232	174	154	125	231	245
1944	167	420	214	219	170	160	138	234	212
1945	171	366	205	232	198	170	127	227	224
1946	228	382	178	249	212	209	146	317	204
1947									
January	240	390	185	351	188	216	147	401	238
February	246	319	188	260	192	225	147	391	275
March	257	336	199	268	234	276	147	390	299
April	260	301	211	265	254	271	145	390	295
May	270	446	220	265	248	270	142	371	286
June	275	460	224	284	288	247	135	353	215
July	289	485	242	286	313	242	127	350	189
August	267	381	231	308	341	238	129	335	211
September	252	407	214	273	374	275	136	335	179
October	247	416	214	233	347	301	142	402	238
November	257	400	238	222	341	310	146	395	272
December	275	469	247	232	369	316	152	420	294

Wholesale Prices of Ammoniates

	Nitrate of soda per unit N bulk	Sulphate of ammonia bulk per unit N	Cottonseed meal S. E. Mills per unit N	Fish scrap, dried 11–12% ammonia, 15% bone phosphate, f.o.b. factory, bulk per unit N	Tankage 11% ammonia, 15% bone phosphate, f.o.b. Chicago, bulk, per unit N	High grade ground blood, 16–17% ammonia, Chicago, bulk per unit N
1910–14	$2.68	$2.85	$3.50	$3.53	$3.37	$3.52
1923	3.02	2.90	6.19	4.83	4.59	5.16
1924	2.99	2.44	5.87	5.02	3.60	4.25
1925	3.11	2.47	5.41	5.34	3.97	4.75
1926	3.06	2.41	4.40	4.95	4.36	4.90
1927	3.01	2.26	5.07	5.87	4.32	5.70
1928	2.67	2.30	7.06	6.63	4.92	6.00
1929	2.57	2.04	5.64	5.00	4.61	5.72
1930	2.47	1.81	4.78	4.96	3.79	4.58
1931	2.34	1.46	3.10	3.95	2.11	2.46
1932	1.87	1.04	2.18	2.18	1.21	1.36
1933	1.52	1.12	2.95	2.86	2.06	2.46
1934	1.52	1.20	4.46	3.15	2.67	3.27
1935	1.47	1.15	4.59	3.10	3.06	3.65
1936	1.53	1.23	4.17	3.42	3.58	4.25
1937	1.63	1.32	4.91	4.66	4.04	4.80
1938	1.69	1.38	3.69	3.76	3.15	3.53
1939	1.69	1.35	4.02	4.41	3.87	3.90
1940	1.69	1.36	4.64	4.36	3.33	3.39
1941	1.69	1.41	5.50	5.32	3.76	4.43
1942	1.74	1.41	6.11	5.77	5.04	6.76
1943	1.75	1.42	6.30	5.77	4.86	6.62
1944	1.75	1.42	7.68	5.77	4.86	6.71
1945	1.75	1.42	7.81	5.77	4.86	6.71
1946	1.97	1.44	11.04	7.38	6.60	9.33
1947						
January	2.36	1.46	12.98	11.06	12.14	10.32
February	2.41	1.46	10.01	11.06	12.14	10.17
March	2.41	1.46	11.98	11.06	12.50	10.50
April	2.41	1.51	11.72	10.79	12.75	11.39
May	2.41	1.51	10.55	9.98	12.75	8.80
June	2.41	1.51	10.94	9.98	12.75	8.26
July	2.41	1.59	12.56	9.98	12.75	8.66
August	2.53	1.60	13.01	9.98	12.75	8.73
September	2.66	1.73	13.65	10.41	12.75	10.72
October	2.66	1.78	15.00	10.85	12.75	13.66
November	2.66	1.78	14.22	11.06	12.75	11.53
December	2.71	1.78	15.98	11.71	12.75	12.81
Index Numbers (1910-14 = 100)						
1923	112	102	177	137	136	147
1924	111	86	168	142	107	121
1925	115	87	155	151	117	135
1926	113	84	126	140	129	139
1927	112	79	145	166	128	162
1928	100	81	202	188	146	170
1929	96	72	161	142	137	162
1930	92	64	137	141	12	130
1931	88	51	89	112	63	70
1932	71	36	62	62	36	39
1933	59	39	84	81	97	71
1934	59	42	127	89	79	93
1935	57	40	131	88	91	104
1936	59	43	119	97	106	131
1937	61	46	140	132	120	122
1938	63	48	105	106	93	100
1939	63	47	115	125	115	111
1940	63	48	133	124	99	96
1941	63	49	157	151	112	126
1942	65	49	175	163	150	192
1943	65	50	180	163	144	189
1944	65	50	219	163	144	191
1945	65	50	223	163	144	191
1946	74	51	315	209	196	265
1947						
January	88	51	371	313	360	293
February	90	51	286	313	360	289
March	90	51	342	313	371	298
April	90	53	335	306	378	324
May	90	53	301	283	378	250
June	90	53	313	283	378	234
July	90	56	359	283	378	246
August	94	56	372	283	378	248
September	99	61	390	295	378	305
October	99	62	429	307	378	388
November	99	62	406	313	378	328
December	101	62	457	332	378	364

Wholesale Prices of Phosphates and Potash **

	Superphosphate Baltimore, per unit	Florida land pebble 68% f.o.b. mines, bulk, per ton	Tennessee phosphate rock, 75% f.o.b. mines, bulk, per ton	Muriate of potash bulk, per unit, c.i.f. Atlantic and Gulf ports[1]	Sulphate of potash in bags, per unit, c.i.f. Atlantic and Gulf ports[1]	Sulphate of potash magnesia, per ton, c.i.f. Atlantic and Gulf ports[1]	Manure salts bulk, per unit, c.i.f. Atlantic and Gulf ports[1]
1910–14	$0.536	$3.61	$4.88	$0.714	$0.953	$24.18	$0.657
1923	.550	3.08	7.50	.588	.836	23.32	....
1924	.502	2.31	6.60	.582	.860	23.72	....
1925	.600	2.44	6.16	.584	.860	23.72	....
1926	.598	3.20	5.57	.596	.854	23.58	.537
1927	.525	3.09	5.50	.646	.924	25.55	.586
1928	.580	3.12	5.50	.669	.957	26.46	.607
1929	.609	3.18	5.50	.672	.962	26.59	.610
1930	.542	3.18	5.50	.681	.973	26.92	.618
1931	.485	3.18	5.50	.681	.973	26.92	.618
1932	.458	3.18	5.50	.681	.963	26.90	.618
1933	.434	3.11	5.50	.662	.864	25.10	.601
1934	.487	3.14	5.67	.486	.751	22.49	.483
1935	.492	3.30	5.69	.415	.684	21.44	.444
1936	.476	1.85	5.50	.464	.708	22.94	.505
1937	.510	1.85	5.50	.508	.757	24.70	.556
1938	.492	1.85	5.50	.523	.774	15.17	.572
1939	.478	1.90	5.50	.521	.751	24.52	.570
1940	.516	1.90	5.50	.517	.730	24.75	.573
1941	.547	1.94	5.64	.522	.780	25.55	.367[1]
1942	.600	2.13	6.29	.522	.810	25.74	.205
1943	.631	2.00	5.93	.522	.786	25.35	.195
1944	.645	2.10	6.10	.522	.777	25.35	.195
1945	.650	2.20	6.23	.522	.777	25.35	.195
1946	.671	2.41	6.50	.508	.769	24.70	.190
1947							
January	.700	2.60	6.60	.535	.797	26.00	.200
February	.720	2.60	6.60	.535	.799	26.00	.200
March	.740	2.75	6.60	.535	.797	26.00	.200
April	.740	2.97	6.60	.535	.797	26.00	.200
May	.740	2.97	6.60	.535	.797	26.00	.200
June	.752	2.97	6.60	.330[1]	.589[1]	12.76[1]	.176
July	.760	2.97	6.60	.353	.629	13.63	.188
August	.760	3.08	6.60	.353	.629	13.63	.188
September	.760	3.42	6.60	.353	.629	13.63	.188
October	.760	3.42	6.60	.375	.669	14.50	.200
November	.760	3.42	6.60	.375	.669	14.50	.200
December	.760	3.42	6.60	.375	.669	14.50	.200
Index Numbers (1910-14 = 100)							
1923	103	85	154	82	88	96	....
1924	94	64	135	82	90	98	....
1925	110	68	126	82	90	98	....
1926	112	88	114	83	90	98	82
1927	100	86	113	90	97	106	89
1928	108	86	113	94	100	109	92
1929	114	88	113	94	101	110	93
1930	101	88	113	95	102	111	94
1931	90	88	113	95	102	111	94
1932	85	88	113	95	101	111	94
1933	81	86	113	93	91	104	91
1934	91	87	110	68	79	93	74
1935	92	91	117	58	72	89	68
1936	89	51	113	65	74	95	77
1937	95	51	113	71	79	102	85
1938	92	51	113	73	81	104	87
1939	89	53	113	73	79	101	87
1940	96	53	113	72	77	102	87
1941	102	54	110	73	82	106	87
1942	112	59	129	73	85	106	84
1943	117	55	121	73	82	105	83
1944	120	58	125	73	82	105	83
1945	121	61	128	73	82	105	83
1946	125	67	133	71	81	102	82
1947							
January	131	72	135	75	84	108	83
February	134	72	135	75	84	108	83
March	138	76	135	75	84	108	83
April	138	82	135	75	84	108	83
May	138	82	135	75	84	108	83
June	140	82	135	60	62	53	80
July	142	82	135	64	66	56	82
August	142	85	135	64	66	56	82
September	142	95	135	64	66	56	82
October	142	95	135	68	70	60	83
November	142	95	135	68	70	60	83
December	142	95	135	68	70	60	83

Combined Index Numbers of Prices of Fertilizer Materials, Farm Products and All Commodities

	Farm prices*	Prices paid by farmers for commodities bought*	Wholesale prices of all commodities†	Fertilizer material‡	Chemical ammoniates	Organic ammoniates	Superphosphate	Potash**
1923.....	143	152	147	114	107	144	103	79
1924.....	143	152	143	103	97	125	94	79
1925.....	156	156	151	112	100	131	109	80
1926.....	146	155	146	119	94	135	112	86
1927.....	142	153	139	116	89	150	100	94
1928.....	151	155	141	121	87	177	108	97
1929.....	149	154	139	114	79	146	114	97
1930.....	128	146	126	105	72	131	101	99
1931.....	90	126	107	83	62	83	90	99
1932.....	68	108	95	71	46	48	85	99
1933.....	72	108	96	70	45	71	81	95
1934.....	90	122	109	72	47	90	91	72
1935.....	109	125	117	70	45	97	92	63
1936.....	114	124	118	73	47	107	89	69
1937.....	122	131	126	81	50	129	95	75
1938.....	97	123	115	78	52	101	92	77
1939.....	95	121	112	79	51	119	89	77
1940.....	100	122	115	80	52	114	96	77
1941.....	124	131	127	86	56	130	102	77
1942.....	159	152	144	93	57	161	112	77
1943.....	192	167	151	94	57	160	117	77
1944.....	195	176	152	96	57	174	120	76
1945.....	202	180	154	97	57	175	121	76
1946.....	233	203	177	107	62	240	125	75
1947								
January...	260	227	206	126	69	359	131	78
February..	262	234	209	124	70	329	134	78
March.....	280	240	216	128	70	354	138	78
April.....	276	243	215	129	71	354	138	78
May.....	272	242	215	127	71	339	138	78
June.....	271	244	215	125	71	343	140	63
July.....	276	244	219	128	72	359	142	67
August....	276	249	223	130	75	364	142	67
September.	286	253	230	133	79	372	142	67
October...	289	254	230	136	80	387	142	71
November.	287	257	231	135	80	380	142	71
December..	301	267	236	138	81	400	142	71

* U. S. D. A. figures. Beginning January 1946 farm prices and index numbers of specific farm products revised from a calendar year to a crop-year basis. Truck crops index adjusted to the 1924 level of the all-commodity index.

† Department of Labor index converted to 1910-14 base.

‡ The Index numbers of prices of fertilizer materials are based on original study made by the Department of Agricultural Economics and Farm Management, Cornell University, Ithaca, New York. These indexes are complete since 1897. The series was revised and reweighted as of March 1940 and November 1942.

[1] **All potash salts now quoted F.O.B. mines only: manure salts since June 1941, other carriers since June 1947.**

** **The weighted average of prices actually paid for potash are lower than the annual average because since 1926 over 90% of the potash used in agriculture has been contracted for during the discount period. Since 1937, the maximum discount has been 12%. Applied to muriate of potash, a price slightly above $.471 per unit K_2O thus more nearly approximates the annual average than do prices based on arithmetical averages of monthly quotations.**

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture, the State Experiment Stations, and Canada, relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

"Fertilizer Handbook for Arizona Farmers," Agr. Exp. Sta., Univ. of Ariz., Tucson, Ariz., Bul. 209, Sept. 1947, W. T. McGeorge.

"Commercial Fertilizer Sales as Reported to Date for Quarter Ended September 30, 1947," Bu. of Chem., State Dept. of Agr., Sacramento 14, Calif., FM-155, Nov. 28, 1947.

"Agricultural Mineral Sales as Reported to Date for Quarter Ended September 30, 1947," Bu. of Chem., State Dept. of Agr., Sacramento 14, Calif., FM-156, Nov. 28, 1947.

"Purchasing Fertilizers in New Hampshire," Agr. Exp. Sta., Univ. of N. H., Durham, N. H., Sta. Bul. 362, Oct. 1945, L. A. Dougherty.

"Inspection of Commercial Fertilizers Made for the State Department of Agriculture," Dept. of Agr. and Biol. Chem., Agr. Exp. Sta., Univ. of N. H., Durham, N. H., Bul. 371, Aug. 1947, T. O. Smith and H. A. Davis.

"The Movement of Phosphorus in Red Maple and Apple Trees in Winter Using Radioactive Phosphorus as a Tracer," Agr. Exp. Sta., Univ. of N. H., Durham, N. H., Tech. Bul. 91, Dec. 1946.

"Fertilizer Suggestions for North Dakota Farms," Ext. Serv., N. D. Agr. College, Fargo, N. D., Ext. Cir. 189, Jan. 1947, L. A. Jensen and G. A. Johnsgard.

"Fertilizer Report for the Year 1946," State Dept. of Agr., Harrisburg, Pa., Gen. Bul. 612, May-June 1947.

"Response of Stayman Apple Trees in Metal Cylinders to Varying Amounts of Inorganic Nitrogenous Fertilizers and Green Manures," Agr. Exp. Sta., Pa. State College, State College, Pa., Bul. 483, Oct. 1946, R. D. Anthony, W. S. Clarke, Jr., F. N. Fagan, D. E. H. Frear, A. C. Richer, and J. W. White.

"Commercial Fertilizers in 1946-47," Agr. Exp. Sta., Texas A. & M., College Station, Texas, Bul. 696, Oct. 1947, J. F. Fudge and T. L. Ogier.

"Report of Inspection Work, Commercial Fertilizers and Limes," State Dept. of Agr., Charleston, W. Va., Bul. (n.s.) 52, Dec. 1, 1946.

"The Fertilizer Situation for 1947-48," Production and Marketing Admin., U. S. D. A., Wash., D. C., Dec. 1947.

Soils

"The Relation of Soil Fertility to Human Nutrition," Agr. Exp. Sta., Miss. State College, State College, Miss., Bul. 437, Sept. 1946, Olive Sheets.

"Improved Irrigation," Agr. Ext. Serv., Univ. of Nebr., Lincoln, Nebr., E. C. 170, March 1947.

"Stubble Mulch Farming," Agr. Ext. Serv., Univ. of Nebr., Lincoln, Nebr., E. C. 171, Feb. 1947, F. L. Duley and J. C. Russell.

"Influence of Soil Texture Upon Growth of Plants," Agr. Exp. Sta., Univ. of N. H., Durham, N. H., Tech. Bul. 90, May 1946, Stuart Dunn and W. H. Lyford, Jr.

"Acid Soils in Oklahoma, Where They Are Located, and How They Form," Agr. Exp. Sta., Okla. A. & M., Stillwater, Okla., Bul. B-313, Nov. 1947, Horace J. Harper.

"Soil Reaction and Availability of Plant Nutrients," Agr. Exp. Sta., Okla. A. & M., Stillwater, Okla., Bul. B-315, Nov. 1947, Horace J. Harper.

"Crop Adaptation to Soils of Varying Acidity or Alkalinity," Agr. Exp. Sta., Okla. A. & M., Stillwater, Okla., Bul. B-316, Dec. 1947, Horace J. Harper.

"Reclamation and Use of Alkali Soils," Agr. Exp. Sta., Oregon State College, Corvallis, Oregon, Tech. Bul. 10, Sept. 1946, W. L. Powers.

"Optimum Soil-Nitrate Levels for Celery, Carrots, Spinach, Onions and Beets at Different Growth Levels," Agr. Exp. Sta., R. I. State College, Kingston, R. I., Bul. 300, June 1947, John B. Smith and Milton Salomon.

"Improve Your Garden Soil," Ext. Serv., Texas A. & M., College Station, Texas, C-143, 1946, J. F. Rosborough, C. R. Heaton, and M. K. Thornton.

"The Soil Saving 7 for Washington's Wheatland," Ext. Serv., Institute of Agr. Sciences, State College of Wash., Pullman, Wash., Ext. Cir. 117, Nov. 1947.

Crops

"Small Grain Variety Tests in Alabama, 1945-1947," Agr. Exp. Sta., Ala. Polytechnic Institute, Auburn, Ala., P. R. Series No. 11, Rev. Aug. 1947, T. H. Rogers.

"The Dominion Experimental Farms," Dominion Dept. of Agr., Ottawa, Can., 1947.

"Planning Your Garden," Div. of Hort., Exp. Farms Serv., Dominion Dept. of Agr., Ottawa, Ont., Can., Publ. 795, Farmer's Bul. 142, Sept. 1947, R. W. Oliver.

"Better Ontario Pastures," Ont. Agr. College, Guelph, Ont., Can., Bul. 450, June 1947, J. R. Weir.

"Vegetable Varieties and Hybrids," Ont. Agr. College, Guelph, Ont., Can., Bul. 451, Aug. 1947, T. O. Graham and J. S. Shoemaker.

"Harvesting and Storing of Ear Corn," Ont. Agr. College, Guelph, Ont., Can., Bul. 452, Aug. 1947, G. P. McRostie.

"Grass and Legume Seed Crops in Alberta," Dept. of Agr., Edmonton, Alberta, Can., Cir. 79, Aug. 1947, J. E. Birdsall.

"Grape Growing in Florida," Agr. Exp. Sta., Univ. of Fla., Gainesville, Fla., Bul. 436, (A Revision of Bul. 324), Oct. 1947, R. D. Dickey and Kenneth W. Loucks, Rev. by R. D. Dickey, L. H. Stover, and G. K. Parris.

"Vegetable Varieties for Hawaii," Agr. Ext. Serv., Univ. of Hawaii, Honolulu 10, T. H., Ext. Cir. 63, Rev. July 1947, William Bembower.

"Bush Beans as a Truck Crop," Agr. Ext. Serv., La. State Univ., Baton Rouge, La., Ext. Leaflet 6, John A. Cox, Ralph S. Woodward, and Joseph Montelaro.

"Bell Pepper Production in Louisiana," Agr. Ext. Serv., La. State Univ., Baton Rouge, La., Ext. Leaflet 7, John A. Cox, Joseph Montelaro, and Ralph S. Woodward.

"Garlic as a Truck Crop," Agr. Ext. Serv., La. State Univ., Baton Rouge, La., Ext. Leaflet 9, G. L. Tiebout and Joseph Montelaro.

"Tomatoes as a Truck Crop," Agr. Ext. Serv., La. State Univ., Baton Rouge, La., Ext. Leaflet 10, Ralph S. Woodward, John A. Cox, and Joseph Montelaro.

"One Year's Progress with the Maine Extension Service for the Year Ending June 30, 1947," Agr. Ext. Serv., Univ. of Maine, Orono, Maine, Ext. Bul. 366, Oct. 1947.

"60th Annual Report," Agr. Exp. Sta., Univ. of Nebr., Lincoln, Nebr.

"Alfalfa and Sweetclover Silage," Agr. Ext. Serv., Univ. of Nebr., Lincoln, Nebr., E. C. 173, June 1947, D. L. Gross.

"Preharvest Apple Drop, with Special Reference to McIntosh," Agr. Exp. Sta., Univ. of N. H., Durham, N. H., Sta. Bul. 355, July 1945, L. P. Latimer.

"Growing House Plants," Agr. Exp. Sta., Univ. of N. H., Durham, N. H., Sta. Bul. 359, June 1945, W. D. Holley.

"Performance of Strawberry Varieties in New Hampshire," Agr. Exp. Sta., Univ. of N. H., Durham, N. H., Sta. Bul. 368, Dec. 1946, L. P. Latimer.

"Viable Seeds in Old Pasture Soils," Agr. Exp. Sta., Univ. of N. H., Durham, N. H., Tech. Bul. 89, May 1946, Ford S. Prince and A. R. Hodgdon.

"Red Raspberry Culture," Gen. Ext. Serv., Univ. of N. H., Durham, N. H., Cir. 264, Jan. 1945, L. P. Latimer.

"The Home Vegetable Garden," Gen. Ext. Serv., Univ. of N. H., Durham, N. H., Ext. Cir. 273, Apr. 1946, J. R. Hepler.

"Culture of Low-Bush Blueberries," Gen. Ext. Serv., Univ. of N. H., Durham, N. H., Ext. Cir. 275, June 1946, W. W. Smith.

"Christmas Trees, a Cash Crop," Gen. Ext. Serv., Univ. of N. H., Durham, N. H., Ext. Cir. 278, Oct. 1946, K. E. Barraclough.

"4-H Vegetable Gardening," Gen. Ext. Serv., Univ. of N. H., Durham, N. H., Jr. Cir. 60, March 1946.

"Peonies, Their Culture and Care in North Dakota," Ext. Serv., N. D. Agr. College, Fargo, N. D., Cir. A-112, June 1947.

"Bearded Iris," Ext. Serv., N. D. Agr. College, Fargo, N. D., Cir. A-113, July 1947, Harry A. Graves.

"Roses for North Dakota," Ext. Serv., N. D. Agr. College, Fargo, N. D., Cir. A-118, Sept. 1947, Harry A. Graves.

"Tulips," Ext. Serv., N. D. Agr. College, Fargo, N. D., Cir. A-119, Oct. 1947, Harry A. Graves.

"Hardy Chrysanthemums," Ext. Serv., N. D. Agr. College, Fargo, N. D., Cir. A-120, Oct. 1947, Harry A. Graves.

"Evergreens for North Dakota," Ext. Serv., N. D. Agr. College, Fargo, N. D., Cir. A-121, Oct. 1947, John J. Zaylskie.

"Onion Production in Ohio," Agr. Exp. Sta., Wooster, Ohio, Bul. 671, Nov. 1947, Donald Comin.

"Permanent Pastures, Treatment and Management," Agr. Ext. Serv., Ohio State Univ., Columbus, Ohio, No. 283, July 1947, D. R. Dodd.

"Trees and Tree Planting for Posts, Windbreaks and Erosion Control," Agr. Exp. Sta., Okla. A. & M., Stillwater, Okla., Sta. Bul. B-314, Nov. 1947, M. Afanasiev.

"Performance Tests of Corn Varieties and Hybrids, 1947," Agr. Exp. Sta., Okla. A. & M., Stillwater, Okla., Bul. B-317, Dec. 1947, James S. Brooks and Roy A. Chessmore.

"Fruit Varieties Recommended for Oklahoma," Ext. Serv., Okla. A. & M., Stillwater, Okla., Cir. 444, E. L. Whitehead.

"Rhubarb Growing and Forcing," Federal Coop. Ext. Serv., Oregon State College, Corvallis, Oregon, Ext. Cir. 486 (Rev. of Cir. 256), May 1946, A. G. B. Bouquet.

"Specialty Horticultural Crops, 1936-1945," Federal Coop. Ext. Serv., Oregon State College, Corvallis, Oregon, Ext. Bul. 677, March 1947, B. E. Black.

"Science for the Farmer," 60th Annual Report, Agr. Exp. Sta., Pa. State College, State College, Pa., Bul. 488, July 1947.

"Science for the Farmer," Agr. Exp. Sta., Pa. State College, State College, Pa., Supplement No. 1 to Bul. 488, Oct. 1947, M. E. John.

"Chemical Composition of Pasture Plants, With Some Reference to the Dietary Needs of Grazing Animals," Agr. Exp. Sta., Pa. State College, State College, Pa., Bul. 489, Nov. 1947, J. T. Sullivan and R. J. Garber.

"Pea Variety and Strain Trials, 1947," Agr. Exp. Sta., Pa. State College, State College, Pa., Pa. Jour. Series Paper #1389, Sept. 3, 1947, R. E. Larson.

"Snap Bean Variety and Strain Trials, 1947," Agr. Exp. Sta., Pa. State College, State College, Pa., Pa. Jour. Series Paper #1392, Sept. 25, 1947, M. L. Odland and C. J. Noll.

"Tomato Variety and Strain Trials, 1947," Agr. Exp. Sta., Pa. State College, State College, Pa., Pa. Jour. Series Paper #1393, Sept. 25, 1947, M. L. Odland.

"Sweet Corn Variety and Strain Trials, 1947," Agr. Exp. Sta., Pa. State College, State College, Pa., Pa. Jour. Series Paper #1398, Oct. 15, 1947, C. J. Noll and M. L. Odland.

"Lima Bean Variety and Strain Trials, 1947," Agr. Exp. Sta., Pa. State College, State College, Pa., Pa. Jour. Series Paper #1403, Nov. 10, 1947, M. L. Odland and C. J. Noll.

"Eggplant Variety and F_1 Hybrid Trials, 1947," Agr. Exp. Sta., Pa. State College, State College, Pa., Pa. Jour. Series Paper #1406, Nov. 15, 1947, M. L. Odland and C. J. Noll.

"Research for the Farmer," Agr. Exp. Sta., R. I. State College, Kingston, R. I., 59th Annual Report, May 1947.

"What's New in Farm Science," Agr. Exp. Sta., Univ. of Wis., Madison, Wis., Bul. 472, May 1947.

Economics

"A Study of Pioneer Farming in the Fringe Areas of the Peace River, Alberta, 1942," Dominion Dept. of Agr., Edmonton, Alberta, Can., Publ. 792, Tech. Bul. 60, Oct. 1947, B. K. Acton and C. C. Spence.

"Farming in the Irrigation Districts of Alberta," Dominion Dept. of Agr., Edmonton, Alberta, Can., Publ. 793, Tech. Bul. 81, Nov. 1947, C. C. Spence, B. H. Kristjanson, and J. L. Anderson.

"A Study of Land Settlement in the Prince George-Smithers Area, British Columbia," Dominion Dept. of Agr., Edmonton, Alberta, Can., Publ. 794, Tech. Bul. 82, Oct. 1947, W. J. Anderson.

"Statistical Handbook of Canadian Tobacco," Agr. Div., Dominion Bu. of Statistics, Ottawa, Ont., Can., 1947.

"Marketing Island-Grown Sweetpotatoes in Consumer Packages," Agr. Ext. Serv., Univ. of Hawaii, Honolulu 10, T. H., Ext. Cir. 226, Oct. 1947, Ralph Elliott and Kenichi Murata.

"Monthly Price-Yield Trends for Some Hawaiian Fruit and Vegetable Crops," Agr. Ext. Serv., Univ. of Hawaii, Honolulu 10, T. H., Ext. Cir. 227, Oct. 1947, Ralph Elliott and Jack Ishida.

"Harvesting and Packing Tomatoes," Agr. Ext. Serv., Univ. of Hawaii, Honolulu 10, T. H., Ext. Cir. 228, Nov. 1947, Ralph Elliott and Kenichi Murata.

"Twenty-second Annual Report of the Farm Bureau Farm Management Service, 1946," Dept. of Agr. Econ., Univ. of Ill., Urbana, Ill., AE-539, June 1947, M. L. Mosher and F. J. Reiss.

"Three-year Report on 174 Farms in the Blackhawk Farm Bureau Farm Management Service, 1943-1944-1945," Agr. Ext. Serv., Univ. of Ill., Urbana, Ill., AE-2414, Sept. 1946, M. L. Mosher, F. J. Reiss, and W. D. Buddemeier.

"Three-year Report on 193 Farms in the Illinois Valley Farm Bureau Farm Management Service, 1943-1944-1945," Agr. Ext. Serv., Univ. of Ill., Urbana, Ill., AE-2416, Oct. 1946, M. L. Mosher, F. J. Reiss, and M. P. Gehlbach.

"Clearing and Improvement of Farm Land in Massachusetts," Agr. Exp. Sta., Univ. of Mass., Amherst, Mass., Bul. 439, July 1947, Charles R. Creek, Joseph F. Hauck, and Virgil L. Hurlburt.

"Costs and Labor Used in Harvesting Hay, 204 Pennsylvania Farms, 1945," Agr. Exp. Sta., Pa. State College, State College, Pa., Bul. 490, Sept. 1947, W. E. Keepper and L. B. Adkinson.

"Father and Son Farm Business Agreements," Agr. Exp. Sta., Pa. State College, State College, Pa., Bul. 492, Jan. 1948, P. I. Wrigley.

"Farm Practices on Burley Tobacco, Tomatoes, Snap Beans in Douglas Reservoir Area," Agr. Exp. Sta., Univ. of Tenn., Knoxville, Tenn., Rural Research Series Mono. No. 227, Aug. 10, 1947, M. B. Badenhop and L. J. Fenske.

"Trends in Livestock Production in Tennessee by Type of Farming Areas," Agr. Exp. Sta., Univ. of Tenn., Knoxville, Tenn., Rural Research Series Mono. No. 228, Aug. 15, 1947, B. H. Luebke.

"Coordinated Management for Harvesting, Storing, and Marketing Northwest Apples," U. S. D. A., Washington, D. C., Cir. 759, Sept. 1947, W. V. Hukill and Len B. Wooton.

"Handbook on Major Regional Farm Supply Purchasing Cooperatives, 1945-46," Coop. Research and Serv. Div., Farm Credit Admin., U. S. D. A., Washington, D. C., Misc. Rpt. 110, Oct. 1947, Joseph G. Knapp and Jane L. Scearce.

"Grain Conservation on Farms, 1947-48," Office of the Secretary, U. S. D. A., Washington, D. C., Handbook, Nov. 1947.

"Agricultural Conservation Program Bulletin, Subpart-1948," U. S. D. A., Washington, D. C.

"The 1948 Agricultural Conservation Program Handbook for: ACP-1948-Calif.; ACP-1948-Colo.; ACP-1948-Fla.; ACP-1948-Ga.; ACP Specifications-1948-Idaho, Part II; ACP-48-Kansas, Part I, Section 2; ACP-1948-Ky.; ACP-1948-Me.; ACP-1948-Mich.; ACP-1948-Minn.; ACP-1948-Miss.; ACP-1948-Mo.; ACP-1948-Nebr.; ACP-1948-N. Y.; ACP-1948-N. C.; ACP-1948-Okla.; ACP-1948-S. C.; ACP-1948-Texas," U. S. D. A., Washington, D. C.

Soil Testing and Soil Conservation

(*From page* 22)

land need?" The Conservationist could make a blanket lime and fertilizer recommendation that might do a pretty good job. This farmer, however, knows that his soils differ from place to place. Therefore, it seems to him that the less productive areas should have some sort of treatment different from the more productive areas.

The Conservationist solves this problem by taking a sample of soil for analysis from every field on the entire farm. Securing proper soil samples will take the farmer and Conservationist together onto and over every acre of land on the farm. With a capability map, this is an ideal time and occasion for the farmer to observe with the Conservationist the depth of topsoil, degree of erosion, texture of top and subsoil, the present plant growth, the poorly drained areas, or any other problem areas that are on the farm. The correlation between the capability map and what is actually found in the field is noted, explained, and discussed freely.

There is something about collecting his soil sample that fascinates the farmer. The land takes on a new perspective. He has farmed his land for years, but now he is feeling the texture of the subsoil with eagerness. He watches his soil as it comes from every hole; never before has he been so ready to learn about his own soil, its limitations, its adaptability, how to hold it, how to improve it, how to really succeed with it. As the Conservationist and farmer go along planning the farm, specific treatment is suggested for the various areas. Hunger or deficiency signs are noted and discussed, and the farmer is prepared in a general way for changes in his lime and fertilization program.

The farm plan and soil sampling are completed; the soils are forwarded to the Soil Testing laboratory; and the office work for the farm plan is begun. When the office work is completed, the farm plan is sent to the District and Regional office for approval and typing. By the time these are completed, the soil-testing results will have returned, two copies coming to the Conservationist and one to the Farm Agent. The results of the tests for each field are reported showing the pH, calcium, magnesium, phosphorus, potash, and organic matter content. Some other tests are made also, but not reported, since they would not be understood by most farmers.

The Soil-testing Agronomist, having previously classified the soil as to texture, physical characteristics, and approximate type, now notes the type of soil involved, the previous cropping, lime, and fertilizer history, the crop to be grown, and then studies the results of the tests. He remembers the Experiment Station recommendation for this particular area and crop. He notes that this particular soil is deficient in potash; therefore, he recommends more potash than is called for by the general recommendations. The soil may be very acid, in which case he notes the texture, pH, calcium, magnesium, organic matter content, and the exchangeable hydrogen before he recommends lime for this particular soil and crop.

The Soil-testing Agronomist is cognizant of the fact that the Extension Division has a very definite program to increase the yields of this particular crop. For instance, the Extension Division has five steps for increasing corn. Corn happens to be the crop concerned here, and so these five steps are pointed out. The soil-test results are reported, and the detailed recommendations as to lime, nitrogen, phosphorus, and potash needs are made. Then it would be pointed out to the farmer that this is a fairly heavy fertilization program for corn, much more fertilizer than he

has been using in the past, but that it should pay very good dividends if he has normal weather conditions and will use an adapted hybrid, plant 7,000-9,000 plants per acre, cultivate shallow, and lay by when the corn is from 2 to 2½ feet high. Any unusual conditions about the soils are noted and discussed in this letter to the farmer.

Thus, the Experiment Station results have been used, varying the fertilizer recommendations according to the soil test. The Extension Division's five-step program to increase corn production is made to fit this farmer's individual field. He is much more likely to use this information than if passed on as a blanket recommendation, regardless of how good the general recommendation. Furthermore, there is a great deal of additional information obtained from the soil tests which enables the Agronomist to do a more effective job in making recommendations. The personal letter from him is placed in, and becomes a permanent part of, the farmer's working-plan agreement, just the same as the rotation or land-use map. When the working plan or agreement is delivered to the farmer, the lime and fertilizer recommendations are discussed freely. The farmer is also encouraged to talk these recommendations over with the Farm Agent, who has a copy of the letter.

This brings together all of the known information for this particular soil and crop, as far as adaptation and lime and fertilizer needs are concerned. That this type of approach gets results is attested by all who visit the County or talk to the farmers involved.

The New Frontier for Midwestern Farmers

(*From page* 26)

Yield increases for the various crops in this study were 18% for wheat, 15% each for corn and soybeans, and 8% for oats. Such increases on a majority of the farms would go a long way toward meeting future food requirements. At the same time, soil resources would likewise be protected. But how can all this be accomplished?

Soil Conservation Problems

Let us first look at some of the soil conservation problems in the various parts of this vast food-producing area.

Many factors contribute to the production of farm products. The excellent research work of state and federal agencies has brought about improvements in many of these factors. Improved machinery, new disease-resistant and better crop varieties, better lime and fertilizer recommendations, more effective insecticides and fungicides, and better planting and harvesting methods have created possibilities for increased crop production. The skill of farmers has, in general, increased. Yet crop yields have not increased in proportion to these advancements. In fact, in some sections and on many farms, crop yields are on a downward trend, despite the widespread use of many improved practices. What, then, is the reason for the lag in crop yields?

One factor has been overlooked in too many cases. We have failed to look at the soil itself, its depth, its structure, its organic matter content, and its erodibility. Too often we just don't *know our land,* or what the soil is capable of producing permanently without damaging its entire makeup.

Obviously, the approach to our soil deterioration problems must start with a careful study of the soil itself. Remedial measures cannot be advocated in general terms. Planning to meet the needs of each acre or similar piece of land and developing long-time plans for all of the acres on each farm are requisite. This approach is necessary

because conditions vary, acre by acre, on the farm. Soil treatments and cropping systems produce different results where soil conditions vary. The raindrop that causes soils to wash in one field may result in extreme soil compaction in another and produce flooding in still another. Then, too, the adoption and application of the needed conservation measures by farmers in the final analysis depend upon how well they can be fitted into the farm business to produce a satisfactory income for him.

While the soil conservation problems are peculiar to each acre and to each individual farm, certain generalizations of the problems existing in the Upper Mississippi Valley can be made.

Damage to our soil resources can be considered in three categories: (1) the breakdown of soil tilth; (2) erosion; and (3) excessive removal of plant nutrients.

With good soil tilth, the land is easy to work, well-granulated seedbeds can be had with the least amount of tillage, rainfall soaks into the ground quickly, and tile drains function properly.

Heavy cropping to corn and soybeans throughout the central parts of Ohio, Indiana, Illinois, the northern part of Missouri, and western and north-central Iowa has depleted the organic matter and seriously weakened soil structure. The heavier, flatter, soils such as the Clermont and Nappanee soils of Ohio, the Cisne soils in southern Illinois, and the Putnam and Edina soils of Missouri and Iowa were unable to withstand even as intensive cropping as this; and since they had poorer internal drainage to begin with, they have become waterlogged as the soil structure broke down.

Loss of organic matter, beating of raindrops, and prolonged wetness tend to weaken soil structure and lower the quality of tilth. Maintenance of organic matter, protection of the soil surface from the impact of raindrops, and good surface and internal drainage are important considerations on all soils, excepting sands and mucks, if soils are to be easily worked.

Soils of silt or silty clay texture on sloping land are vulnerable to erosion by runoff surface water. Where slopes are long, the problem becomes even more severe. Lighter-textured soils, particularly sands and peat and muck soils, are subject to wind erosion. Much of the productive capacity of land in these states has been materially lowered by erosion.

Excessive removal of plant nutrients with resultant lowered fertility has contributed to the breakdown of tilth and the erosion problems on many farms. While the use of lime and fertilizer has been stepped up considerably in recent years, still not enough of these materials is being used to replace the amounts removed by crops, by erosion, or through leaching.

The cumulative effect of these three damaging forces results in less capacity for air and water in the soil, compaction of the soil, and depletion of fertility. The effect on plant growth is a restriction of the volume of the root zone, less respiration by crop roots, and a curtailed feeding area for the roots.

Solution to Problems

General recommendations which offer a solution to these problems are:

1. Convert to forestry or grazing uses lands which cannot be safely cropped, and stop grazing potential woodlands.

2. Provide a volume of organic matter by using more grasses and legumes in the rotation, applying manure, and keeping the crop residues on the farm. Organic matter accumulations, in excess of that burned up by the row and small grain crops in the rotation, will in time build up a sponge-like capacity for moisture in the soil. The selection of the right kind of sod crops, such as alfalfa-grass combinations, will aid in the development of crumb-like struc-

ture and improved tilth in the soil. Sod crops will also help improve subsoil drainage on some of the imperfectly drained soils and will minimize erosion.

3. Supply lime and fertilizer in amounts needed to meet the needs of the soil and crops grown in the rotation.

4. Farm sloping land on the contour wherever possible. This will conserve water as well as soil, and oftentimes the additional moisture saved will mean the difference between a good crop and a fair or mediocre one.

5. Develop a water disposal system for the farm which will safely dispose of excess runoff water and take care of poorly drained areas. Grassed waterways and terrace outlets should be designed and well protected with resistant turf. Open-ditch and tile drainage, where needed and where installation is feasible, will aid in improving soil structure and tilth and will help in relieving the burden of heavy cropping on sloping land. The use of an improved type of bedding on some of the flat, heavy soils will likewise help prevent the collapse of soil structure and tilth. Terracing can be used on some of the imperfectly drained sloping soils to dispose of surplus surface water.

6. Use supporting conservation practices applicable to topography and soil conditions. Contour strip cropping and terracing can be used on many fields. This will materially reduce soil and water losses and thereby aid in maintaining organic matter, soil structure and tilth, and soil fertility. Wind strip cropping, rough tillage, and shelterbelts are practices adapted to areas where wind erosion is a problem.

7. Employ good tillage practices. Working the soil at the right time is necessary to maintain tilth. Worked when too wet, soils rapidly lose their structure. The selection of tools that promote good soil tilth is likewise important. Exclusive use of the disc is destructive to a crumblike structure, while greater use of the spring-tooth or spike-tooth harrow will favor superior tilth on many soils.

8. Use improvement and management practices on pasture and woodlands and promote more favorable conditions for wildlife.

What Is Being Done

The job ahead is large. The picture may look dark, but things are happening. Farmers are approaching the new frontier in a democratic manner so characteristic of the American way of life. Through locally organized, legal subdivisions of government, namely, soil conservation districts, the concept of sound land use and soil conservation is being advanced through a process of voluntary cooperation. Farmers themselves petition and vote for the creation of the soil conservation district, and elect a governing body, generally composed of five local residents, to represent them. This body of men has the authority to enter into a memorandum of understanding with any local, state, or federal agency, or any legal body, to secure assistance in formulating plans and carrying out soil conservation activities. They develop a program which sets forth the contribution each agency will make. They gear their activities so that no duplication of effort exists.

The first soil conservation districts were organized in 1937. Already about 2,000 districts have been established, comprising over a billion acres. The map (Figure 2) shows the development that has taken place. No movement by farmers themselves has ever gained such momentum in the United States in such a short period of time. Nor has there ever been such a marked transformation of the landscape.

Soil conservation districts have created an awareness of the soil conservation problems through the assistance of the U. S. Soil Conservation Service, the Extension Service, State Agricultural Experimental Stations, AAA,

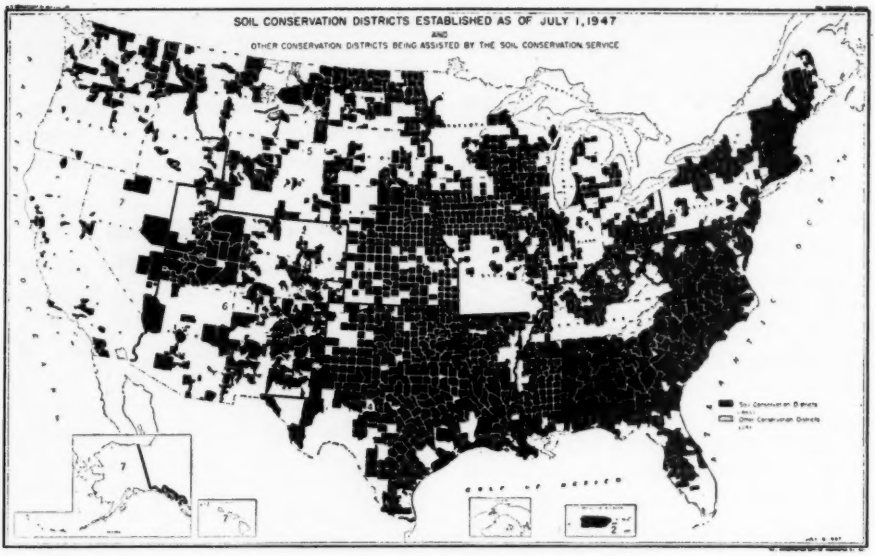

SOIL CONSERVATION DISTRICTS ESTABLISHED AS OF JULY 1, 1947
AND
OTHER CONSERVATION DISTRICTS BEING ASSISTED BY THE SOIL CONSERVATION SERVICE

Fig. 2. Map showing Soil Conservation districts.

State Conservation Departments, state and local agricultural agencies, educational institutions, and of business and industrial concerns. With on-site assistance from soil conservationists furnished by the U. S. Soil Conservation Service, this awareness has been translated to some very marked accomplishments on the land.

A good start has been made toward complete soil conservation on all the farmlands in the Upper Mississippi Valley states. But accomplishments, while very noteworthy, amount to less than 10% of the total job. This new frontier must be expanded as rapidly as possible in the next 20 years if America is to remain strong.

Copper . . . for Tobacco and Other Crops

(*From page* 11)

copper treatments of tobacco would be similar to those obtained in Kentucky and Indiana.

Discussion

In the foregoing experiments, the amount of copper sulfate added to the soil varied from ten to fifty pounds per acre. The optimum requirement has not been established and will differ in soils of varying character. Soils with a high organic content, particularly newly cultivated peat soils, are most frequently discussed in connection with copper deficiency. However, the need for this mineral is not confined to such soils, and copper deficiency is known to occur on many other soil types. Because of the lightness and low organic content of most of the treated soils in the Carolinas, the equivalent of twenty-five pounds of copper sulfate was used as a maximum in the majority of the experiments. Fifty pounds per acre were added with advantageous results in one case, but no plot on the same field was treated with half that amount for contrast.

In Kentucky and Indiana in 1945

TABLE 1.—EFFECT OF COPPER SULFATE APPLICATIONS TO SOIL ON YIELD OF TOBACCO

State	Total number of tests	Increase in monetary value of crop			Decrease in monetary value of crop	
		Increase in wt. of more than 5 per cent	Increase in wt. of 5 per cent or less	Decrease in wt. of 5 per cent or less	Decrease in wt. of 5 per cent or less	Decrease in wt. of more than 5 per cent
North Carolina	31	18	7	2	4	0
South Carolina	5	4	1	0	0	0
Virginia	3	1	1	1	0	0
Kentucky	38	16	7	6	7	2
Indiana	12	7	1	0	3	1
Total	89	46	17	9	14	3
Total number of tests on tobacco yielding monetary increase =72 Total number of tests on tobacco yielding monetary decrease =17						

and 1946, two tests were frequently run simultaneously on different portions of the same field with treatments of twenty and forty pounds per acre. Results from the twenty-pound applications almost invariably gave results equal to or better than the forty-pound applications and in 1947 the latter treatment was discontinued.

Soils with an extremely high organic content require much more copper, and some vegetable growers near Wilmington, North Carolina, apply to newly cleared land approximately one hundred pounds of copper sulfate per acre added with the fertilizer. This application is made several weeks before the spring crops are sown.

Greenhouse and field experiments have shown that, provided a sufficient time has elapsed for the copper to be adsorbed, no harmful effects to a growing crop occur even by high applications of copper sulfate. In our own greenhouses, potted tomato plants were killed by adding high concentrations of copper; but after the death of these plants, others potted in the same soil grew normally. Allison [1] on peat and muck soils of the Everglades found that the toxic effect of as extreme an application as 10,000 pounds of copper sulfate per acre was not permanently serious, although temporarily at this extreme rate, there was some foliage injury to planted crops. Several cooperators reported that with the heavier applications of copper sulfate, tobacco plants started more slowly but grew faster later in the season and eventually weighed as much as, or more than, the controls. Their method of application was to drill the fertilizer, including the copper, in the row and set the tobacco plants in the covering soil. A heavy rain following the planting would result in a concentrated solution near the new roots of the young plants if set too deep, as is frequently the case with larger seedlings. The added copper at this point would not be helpful regardless of its eventual effect on the growth of the plant. No decrease in crop weight has been found in the cases where copper sulfate was applied in a side-dressing.

There are many points in this research that are as yet unanswered, such as the value of light copper applications each year as compared to heavier applications at less frequent intervals. A simple and quick method of determin-

ing the available copper in the soil, so that the copper needs could be determined as easily as the nitrogen, potassium, phosphorus, and calcium requirements, would be of great importance. It is hoped that continued work in the next few years will contribute to our knowledge of these and other points.

Conclusions

In experiments of this type, with so many factors involved, it is difficult to draw conclusions even with a total of approximately one hundred separate tests. The inclusion of the 1947 results probably would change the aspect very little. So far as is known, actual copper deficiency symptoms in tobacco have never been obtained under field conditions although they have been produced in the greenhouse. It is, therefore, not likely that visible deficiency symptoms would ever appear on any of the farms on which the present tests were made, including those showing the greatest response.

Yet, in forty-nine out of the ninety-four plots there were weight increases greater than five per cent, with quality increases in fifteen other cases. This evidence, while not sufficient for statistical treatment at this time, seems to indicate that additional copper is of value to tobacco and other plants and will increase the value of the crop in the majority of cases on the type of land used in the tests.

Summary

In a series of tests conducted in six eastern states from 1943 to 1946, the addition of from twenty to fifty pounds of copper sulfate per acre was found to increase the weight of tobacco in sixty-three out of eighty-nine cases and increased the quality in nine of the remainder so that a monetary increase was obtained by the grower in eighty per cent of the tests. Increases were also obtained with cotton, potatoes, and soybeans.

Literature Cited

1. Allison, R. V., *Studies Upon the Role of Special Elements in Plant Development Upon the Peat and Muck Soils of the Everglades.* Florida Agricultural Station, Annual Report (1931), pages 159-160.

2. Churchman, W. L., Russell, R., and Manns, T. F., *Copper Sulfate as a Plant Nutrient and Soil Amendment.* Crop Protection Digest, Bull. Ser. No. 55 (1936), 16 pages.

3. Willis, L. G. and Piland, J. R., *Some Recent Observations on the Use of Minor Elements in North Carolina Agriculture.* Soil Science, 44 (1937), pages 251-63.

Canada's New Potato Champions

(*From page* 18)

be any problem for many years to come. However, these farmers on their own initiative have learned that light applications of complete fertilizer will give them improved quality in their potatoes even though it does not increase the yield extensively.

Ross Brothers have adopted more or less the same system of management for their potato crop as the other growers in the district. It is designed particularly to fulfill the soil's need for organic matter which is lacking and to overcome the shortage of manure experienced because the district has never developed a livestock population. This has been due largely to a lack of markets or the difficulty of getting livestock products to market quickly enough. Seed potatoes, on the other hand, fitted the economy of this small valley which snuggles among the mountains of the coast range. They can be stored and graded during the fall and winter months and there is no particular rush to move them until it is convenient.

As recently as 1928 there was only one man in the district growing certified potato seed in quantity. W. C. Green, who is still farming in Pember-

Fig. 3. The railroad means everything in the way of transportation to this community. There is no road into Pemberton Valley.

ton, might be called the father of the Pemberton potato. He grew a few tons of seed each year for a very limited market. But as the fame of his seed spread and growers on the coast observed the increase in yield from certified seed, other farmers in Pemberton took up the work, until today the valley ships approximately 25 carloads each season.

The isolation of the valley may have spared it from rapid settlement, but it also prevented disease-carrying insects from infesting the fields with many of the virus diseases common to potatoes. Clean seed from the outset has been a big help to the growers, who are now planning to insure the purity and health of the seed by organizing under the recent Act of the Province to set up a Seed Control Area. This will prevent anyone from planting anything but the best seed and will give the growers control over the movement of potatoes in the district. It will also reduce the hazard of bacterial ring rot being brought in, although the occurrence of that disease has been rare in British Columbia.

Yields of seed are much higher than in most sections. Ross Brothers expect to harvest between 12 and 15 tons of seed potatoes from each acre. Their average last year was close to 500 bushels but that included the seed from a few acres of White Rose which they grew in addition to the Netted Gems which make up the bulk of their crop. Out of the normal crop they expect to grade almost 90% seed ranging from 4 to 16 ounces. The balance of the 10% is split evenly between small seed and culls which go to market as Canada No. 2 for table stock use.

How they obtain such heavy yields is surprising when no manure, or at best only a few loads, is applied to the land. A three-year rotation of clover, which grows luxuriantly in the district, with a fairly heavy late growth skim-plowed in August and deep-plowed in the spring, seems to supply sufficient organic matter to hold the moisture during the heat of summer. This is supplemented with a dressing of 300 to 400 pounds of 6-30-15 fertilizer at planting time. Sandy Ross has tried to use a strictly nitrogen fertilizer or a

combination of nitrogen and phosphorus, since soil analysis does not show need of much potash, but results in his opinion are always much better with a complete fertilizer. In tests conducted at the Illustration Station it was found in one year that nitrogen alone gave a yield comparable to that obtained from an application of NPK, but this did not happen frequently enough for the farmers to depend on it for general practice.

Since most of the seed is grown for foundation stock, the growers are planting it by tuber unit and all fertilizer application, as well as planting, is done by hand. Rows are spaced 34 inches apart and the Gems are planted 12 inches apart in the rows with 18 to 20 inches between units. Such methods have entailed extra work and are time and energy consuming but they have resulted in good yields of excellent seed which other growers have confidence in using for foundation stock.

Root Rot . . . Reduced by Soil Fertility

(*From page 7*)

Acknowledgment is given to Taylor Howard for collecting samples and to Wm. Mierke for making nitrogen determinations.

Discussion

The yield of air-dry roots harvested from the plots receiving limestone and phosphate exceeded that where limestone alone was used by 1,356 pounds or 65.5 per cent. Where both phosphate and potash were used along with the limestone, the harvest of roots exceeded that from where limestone alone was used by 1,572 pounds or over 75.8 per cent. Where limestone and phosphate were used, the yield of air-dry tops exceeded that where limestone alone was used by 2,730 pounds or 95.3 per cent. Where limestone, phosphate, and potash were used, the yield of air-dry tops exceeded that over limestone alone by 4,706 pounds or 164.3 per cent. In total growth of roots and tops where limestone and phosphate were both used, the yield of air-dry material was 4,086 more pounds or 83.3 per cent higher than where limestone alone was used. The yield of roots and tops where limestone, phosphate, and potash were used was 6,278 more pounds or 127.3 per cent higher than where limestone alone was used.

The total nitrogen in the tops and roots combined increased over 100 per cent as a result of the addition of phosphate and about 200 per cent as a consequence of the addition of both phosphate and potash.

The root rot infection varied from severe where limestone was used, to moderate where limestone and phosphate were used, to slight where limestone, phosphate, and potash were used. The differences in the condition of the roots and in the size are shown in Figure I illustrating the growth from equal areas.

Conclusions

The increased growth of roots and tops, and the larger amount of total nitrogen produced on the plots that received lime plus phosphate, and lime plus phosphate and potash, indicate that the additions to the soil of these inorganic plant nutrients reduced the susceptibility of the sweet clover to the root rot "disease."

These facts raise the question whether the root rot is a primary matter or whether it is one secondary to the deficiency of plant nutrients. There is the strong suggestion from these ob-

servations that the trouble of such a weakened root system is merely a consequence of the insufficient fertility and a condition to be remedied, not by an attempt to exterminate the micro-organism attacking the roots, but by feeding the plant more potash in a more fertile soil by which the plant roots are made non-susceptible to the root rot. Are we not about ready to say that the increasing incidence of what we call "disease" is the result of the decreasing fertility supply in our soils?

Success with Alfalfa in Alabama

(*From page* 23)

crop to precede alfalfa the year before it is to be planted.

One year before planting the alfalfa, seed the land to hairy vetch or other good winter legume in the early fall and apply 600 to 1,000 pounds of basic slag or 300 to 500 pounds of superphosphate. Use 50 to 100 pounds of muriate of potash in addition to the phosphate, or apply the equivalent of plant food by using 0-14-10.

Turn the winter legume the following spring when it has made the maximum growth, but before seed forms.

Fig. 2. Fred Stewart and the alfalfa plot on the Belle Mina Station. Four tons per acre had been cut when this picture was made, and it was cut once again before frost. The expected total yield was 4½ to 5 tons per acre.

A few weeks after turning, disk into the soil the amount of lime that lime tests show is needed. Use a good grade of limestone, 40 to 55 per cent of which will pass through a 60-mesh screen and all of which will go through a 10-mesh screen. See that the lime is evenly distributed.

Two or three weeks before the alfalfa is seeded, disk into the soil at least 600 pounds of superphosphate or 1,000 pounds of basic slag. On the heavier red soils of the limestone valleys, use 200 to 300 pounds of muriate of potash. On the gray soils throughout the State, apply 300 to 400 pounds of muriate of potash. Also mix in with the fertilizer around 20 pounds of borax to the acre. Do not break the land just before seeding. Disk the fertilizer into the soil long enough before seeding so that rains settle the seedbed.

Plant Kansas or Oklahoma common alfalfa, using 25 pounds or more of seed per acre, from August 15 to September 1 in northern Alabama, September 1 to September 15 in central Alabama, and October 1 to October 15 in southern Alabama. The seed should be double-inoculated. An even stand can be obtained by dividing the seed into two equal parts and cross-sowing. Cover the seed lightly with a harrow or with a corrugated roller.

By handling alfalfa in this way hay is ready for cutting the following spring, usually in May or June.

Our Honest "Grafters"

(*From page* 5)

sight, gratify the taste, and minister to the enjoyment of life. The more we realize this, the more we shall appreciate the Divine goodness to us, and the duty of providing them for others."

Since then nutritional science has studied and demonstrated carefully the values of diversified fruits and fruit juices. But in a more modern, practical, and unvarnished style, the story is told something like this, in a standard treatise on foods:

"The fresh fruits are good in their content of vitamins B, G, and C. Dried fruits are high in fuel value, due to low moisture content and richness in sugar. Prunes are rich in iron and good sources of vitamins A and B. Apricots carry considerable calcium and are by far the richest fruit source of vitamin A. Juices of the orange, lemon, grape, and apple are especially good for children, as an appetizer, and aid to digestion for those with intestinal disability or acidosis. Fruits have a further favorable action in that the acids and salts which they contain have a specific effect in stimulating the muscular contractions of the intestines."

Utilization methods and transportation of fruits have greatly changed since the APS held its Philadelphia meeting in 1869. To quote a record of the current year over which the officers were exceedingly gratified:

"The ingenious methods of gathering, preserving, and packing fruits and the improved means of safe transportation to distant markets are among the important advances in this new era. To such perfection have these been brought that not only our small, tender fruits come to us a hundred or a thousand miles in good order, but the grape and the pear travel from the Pacific to the Atlantic coast. The pears of California are even now finding a market in Japan." They also paid respects to existing cheap and convenient postal service for the transmission of seeds, scions, and plants, thus promoting the introduction of new varieties into the most remote parts of the land.

Turn to the latest figures for utilization of our fruits as reported by the Department of Agriculture for 1946. Of an apple harvest of 113 million bushels sold off farms, 46 million bushels were canned, dried, frozen, or crushed; about 40 million out of the 79-million-bushel peach crop were processed in some form; about 19 million bushels of the 31-million-bushel pear sales were disposed of other than in fresh form; only 560,000 tons out of three million tons of grapes were sold fresh; and only 46,000 tons of a 335,000-ton apricot crop were delivered to consumers without processing.

THOSE sages of the formative days in horticulture were prophetic in their confidence and vision. Note what Marshall P. Wilder said in two separate meetings prior to 1875:

"Much of the unoccupied country, now greater in extent than all of our present states will, by the aid of the railroads, be opened to cultivation, and Columbia River, Puget Sound, and the whole Pacific Coast with its untold treasures will be united with us in the great work of promoting the pomology of this land. Give us 25 years more, and the whole area from Coast to Coast, from the Dominion to the Gulf, will have hillsides clad with the vine, and valleys adorned with orchards and gardens. Give us 25 years more and our catalogues shall be filled with native varieties and dedicated to American pomologists."

There was also mention made of the northern prairies and in particular of Minnesota and the Dakotas where, it was believed, excellent progress

would soon develop and better types of plums and apples be distributed to the waiting farms. That prophecy is more than doubly made good.

Foreign exports were sought and encouraged even in the Seventies. In the annals of APS for 1876 it is said that 396,000 barrels of Baldwin, Newtown Pippin, and Rhode Island Greening apples were shipped abroad in less than a year. "Since the time of Henry VIII," it was stated, "England has preferred red apples." About 15,000 barrels weekly at from $3.50 to $10 a barrel were the estimates then given of the outlook for British trade. Fully 14 million pounds of dried and $700,000 worth of canned and preserved fruits went overseas in 1876. In the decade between 1861 and 1871, the APS report avers, the value of foreign fruit exports leaped from about $225,000 to nearly $3 million.

LOOKING at our more recent exports, the annual report made by the Secretary of Agriculture shows that between the two world wars the equivalent of 1.3 billion fresh tons, or one-sixth of the deciduous fruit crop, were exported. Readjustment of our marketing pattern to offset the reduced export outlet is one of the biggest problems facing the growers of fruit.

Of the total world crop, this country produces 95 per cent of the grapefruit, 50 per cent of the oranges and lemons, 20 per cent of the apples, about the same percentage for pears, and 69 per cent of the peach crop. Of plums and prunes, our crop represents nearly 40 per cent of the world volume. Lumping them together, the U. S. fruit basket fills 41 per cent of the world's supply of all fruits averaged.

Yet as one looks back to the achievements of those God-fearing men who planted the germs of fruit culture in this country, one cannot help noting that they were farmers first and last. Some of the men who organized and promoted the APS in the early days were also sponsors of the United States Agricultural Society. Fruit was made for the farm, not the farm for fruit, as it seemed to them.

Five years prior to his death at Mt. Vernon, General Washington wrote to Sir John Sinclair, outlining a proposed agricultural society. Again in 1796, when meeting the two Houses of Congress for the last time, Washington said that the cultivation of the soil should become more a matter of public patronage. He endorsed societies and institutions for the collecting and the disseminating of useful, practical agricultural lore.

It is significant that soon after the United States Agricultural Society was formed in 1852 at the Smithsonian Institution, a short address of encouragement was delivered to the body by Hon. George Washington Custis, the farmer of Arlington, adopted son of the late General, and father-in-law of General Robert E. Lee. Although he was more of an artist and country gentleman than he was a diligent farmer, and although General Lee subsequently had some trouble weeding and renovating the famous estate in the present southern suburbs of Washington, the patronage of this worthy man was widely acclaimed by the struggling young society members.

I looked up the record books of the United States Agricultural Society in the files of the huge Department library in Washington. The first agricultural society in America was the Columbian Agricultural Society, formed at Georgetown, D. C., on November 28, 1809. This society held the first regular agricultural fair at Union Hotel, Georgetown, on May 10, 1810. President James Madison was in attendance, wearing his inaugural coat made of merino wool from Colonel Humphrey's flock. The first field trials of any note in farm annals was the implement show by the Columbian Society on May 20, 1812.

It was not until 1840, however, that the U. S. Agricultural Society was born. The famous writer and farmer, Solon Robinson, Esq., called the meeting himself. Unfortunately, the money that was anticipated to come from a munificent Englishman, Mr. Smithson, to found and foster it, was left instead to the scientific work of the great institution bearing his name—and which stands across the street along the Mall from the present U. S. Department of Agriculture.

Finally, the real birth occurred in June, 1852. There were 153 delegates representing 23 states and territories. President Millard Fillmore and Hon. Daniel Webster were delegates. Kentucky, Illinois, Ohio, Michigan, and Wisconsin were the midwest states sending farmers to form the society. Colonel Marshall P. Wilder bobs up again, this time as president of the new society. He served six years and was succeeded by General Tench Tilghman of Maryland.

It thus becomes clear that the horticulturists of those days were primarily farmers, Mr. Wilder and other notables of the APS in its swaddling clothes being purposeful supporters of all branches of the art of husbandry. Note, however, that the APS has reached its century milestone, while the old USAS aforesaid lived less than 20 years.

AS one scans the records and notes the passing scene in horticulture, the evident truth recurs to mind that faith and hope are the watchwords which animate the best of them engaged in this ancient craft. To beautify some local zone, to add some new and choice specimen of the tree or vine, and to plan for generations ahead to reap the harvests of succulence and health—these are very often the mainsprings that keep the works running.

I well remember an uncle of mine who came rather late in life to own a somewhat indifferent piece of ground, a tract that many professional farmers might have scorned. Earlier in his days of job-hunting, he had worked betimes for a nursery firm, and he made calls on farmers to display his gaudy order books and thereby earn an honest penny. Yet not until his sixties did he have a chance to dig a hole in which to plant an apple tree.

So he selected a rough hillside with a northeast slope. He took out his old dog-eared nursery books and placed an order for a few promising, acclimated varieties of plums and apples. He dug and delved like Adam just out of Eden, hauled manure and pails of water, and nursed them with might and main. I recall that a wiseacre neighbor stopped one day and tried to pester Uncle Jim about his orchard ambitions. He sneeringly advised my uncle that it would be fifteen years before a good crop could be expected from those tiny and somewhat skimpy seedlings.

With mien undaunted, Uncle Jim straightened up his aching backbone and replied that he was not interested in who ate the fruit. His main idea, he said, was just to make something good to grow where nothing else but sandburs and ragweeds had grown before. "Maybe someday someone will ask who in thunder planted such a nice Snow apple, and they'll answer: Old Man Smith."

And as we go along in life it isn't such a bad idea, after all, to have our epitaphs and eulogies written in living bark and gorgeous blossom, and perhaps at last a taste of something sweet. To be honest about it myself, I cannot meet this test, but all honor and glory to those who have the opportunity and make the most of it—whether their names are found on an official roster or buried in some family Bible.

Maybe when Adam and Eve stole that forbidden apple from the Garden they started something better than they knew.

AVAILABLE LITERATURE

The following literature on the use of fertilizers in profitable soil and crop management is available for distribution. We shall be glad to send these upon request and in reasonable amounts as long as our supply lasts.

Circulars

Tomatoes (General)
Asparagus (General)
Vine Crops (General)
Sweet Potatoes (General)
Better Corn (Midwest) and (Northeast)
The Cow and Her Pasture (General)

Reprints

N-9 Problems of Feeding Cigarleaf Tobacco
F-3-40 When Fertilizing, Consider Plant-food Content of Crops
S-5-40 What Is the Matter with Your Soil?
H-12-42 Wartime Contribution of the American Potash Industry
J-2-43 Maintaining Fertility When Growing Peanuts
Y-5-43 Value & Limitations of Methods of Diagnosing Plant Nutrient Needs
FF-8-43 Potash for Citrus Crops in California
A-1-44 What's in That Fertilizer Bag?
H-2-44 Efficient Fertilizers for Potato Farms
AA-8-44 Florida Knows How to Fertilize Citrus
QQ-12-44 Leaf Analysis—A Guide to Better Crops
P-3-45 Balanced Fertility in the Orchard
Z-5-45 Alfalfa—the Aristocrat
DD-5-45 A Case of Combined Potassium and Boron Deficiencies in Grapes
GG-6-45 Know Your Soil
OO-8-45 Potash Fertilizers Are Needed on Many Midwestern Farms
TT-10-45 Kudzu Responds to Potash
ZZ-11-45 First Things First in Soil Fertility
CCC-12-45 Poor Soils—Poor People
H-2-46 Plow-sole Placed Plant Food for Better Crop Production
S-4-46 Plow-under Fertilizer Ups Corn Yields
T-4-46 Potash Losses on the Dairy Farm
W-4-46 Muck Soils Produce Quality Sweet Corn for Canning
Y-5-46 Learn Hunger Signs of Crops
AA-5-46 Efficient Fertilizers Needed for Profit in Cotton
BB-5-46 The Soil Is Our Heritage
HH-6-46 Mistakes Versus Essentials of Pond Management for Fish
NN-10-46 Soil Testing—A Practical Aid to the Grower & Industry
WW-11-46 Soil Requirements for Red Clover
ZZ-12-46 Alfalfa—A Crop to Utilize the South's Resources
A-1-47 Fertilizing Vegetables by Applying Fertilizer to Preceding Cover Crop
B-1-47 The Use of Dipicrylamine in Tissue Testing for Potash
D-1-47 Good Pastures Conserve and Pay
G-2-47 Research Points the Way for Higher Corn Yields in North Carolina
H-2-47 Large Grasses for Pasture
I-2-47 Fertilizers and Human Health
K-2-47 Potash Pays for Peas at Chehalis, Washington
M-3-47 The Role of Major Elements in Plant Nutrition
N-3-47 Efficient Management for Abundant Pastures
P-3-47 Year-round Grazing
Q-4-47 Fertilizers for Sugar Beets
R-4-47 The Effects of Fertilizers on the Blackland Soils of Texas
S-4-47 Rice Nutrition in Relation to Stem Rot of Rice
T-4-47 Fertilizer Practices for Profitable Tobacco
V-4-47 Don't Feed Alfalfa at the "Second Table"
W-4-47 The Search for Nutrient Deficiencies in Farm Crops
X-5-47 Potato-growing Developments in New England
Y-5-47 Increasing Grain Production in Mississippi
Z-5-47 Building and Maintaining Good Lawns
AA-5-47 The Potassium Content of Farm Crops
BB-5-47 More Palatable Grass Is More Nutritious
DD-6-47 Profitable Soybean Yields in North Carolina
FF-6-47 Community Cooperation in Soil Conservation
GG-6-47 Corrective Measures for the Salinity Problem in Southwestern Soils
II-8-47 Whole-farm Demonstrations
JJ-8-47 Analyzing the Soils of Northwest Louisiana
KK-8-47 Minor Plant Nutrients
LL-8-47 Reshaping New England Farm Land
MM-8-47 Fertilizing Potatoes Economically in Aroostook County, Maine
NN-10-47 Let's Replace Guessing with Soil Testing
OO-10-47 From Broom Sedge to Beef Cattle
PP-10-47 Potash Fertilization of Alfalfa in Connecticut
QQ-10-47 Fertilizer Placement for Corn on Sandy Soils of Minnesota
RR-10-47 Urine Spots Reveal Soil's Deficiencies
SS-10-47 Soil Fertility and Management Govern Cotton Profits
TT-11-47 How Different Plant Nutrients Influence Plant Growth
UU-11-47 Fertilizer Practice for the Ranger Sweet Potato
VV-11-47 Are You Pasture Conscious?
WW-11-47 At the Tip of the Shoot and the Point of the Root
XX-11-47 Fall and Winter Grazing in Mississippi
YY-11-47 Boron for Vermont Farms
ZZ-11-47 Some Things to Think About
AAA-12-47 Soil Aeration and Crop Response to Fertilizers—1947
BBB-12-47 The Management of Mint Soils
CCC-12-47 Do Soybeans Cause Clover Failures?
DDD-12-47 Florida Grows Good Pasture on Coastal Plain Soils

THE AMERICAN POTASH INSTITUTE
1155 16TH STREET, N. W. WASHINGTON 6, D. C.

She: "My father says a girl shouldn't kiss before twenty."

He: "Well, personally, I don't like a large audience, either."

* * *

DAT AIN'T NO ECHO

Rastus was coming home late at night, and started up the stairs, but much to his dismay, one of the steps creaked and as he hesitated, he heard his wife say, "Who dat?" He didn't answer, but waited a few seconds, and then started up again and in two or three more steps, another creaked. This time a male voice said, "Who dat?" This was too much for Rastus, and he called out, "Who dat say dat second 'Who dat'?"

* * *

Isn't it just too bad, that when Success turns a man's Head, it doesn't Wring his Neck at the same Time?

* * *

The fellow who makes the same mistake over and over doesn't keep his eyes open. There are thousands of other mistakes close at hand which he could make.

* * *

Just how serious a lady's injuries were in an accident which occurred recently, it is hard to tell because the paper spoke thusly of the mishap: "Mrs. Wilson, in attempting to get out of the way of the auto, fell to the pavement, injuring her somewhat."

Enoch had invited Joe for a ride on the back of his new motorcycle. After they had gone a few miles, Enoch asked Joe how he liked it.

"All right," said Joe, "but the wind is catching my chest."

So Enoch stopped. "Take your overcoat off, Joe, and put it on back to front; that will protect your chest a bit, and I'll button it up at the back."

They restarted, and after a while Enoch asked Joe if he was warmer. No reply. Joe wasn't there. Enoch turned the machine around and went back until he saw a crowd, and there was Joe, lying motionless.

Anxiously Enoch asked one of the crowd, "How is he?"

"I can't make it out," said the bystander. "He ain't spoke since we twisted his head the right way around."

* * *

Teacher: "Johnny, I'm surprised! Do you know any more jokes like that?"

Johnny: "Yes, teacher."

Teacher: "Well, stay after school."

* * *

NOT PARTICULAR

Mrs. Jones, supposed to be dying—not for the first time—to parson: "Well, parson, I be agoing this time. I'll soon have me 'ead on Lazarus' bosom."

Parson: "You mean Abraham, not Lazarus, Mrs. Jones."

Mrs. Jones: "If you'd been a widder as long as me yer wouldn't be partickler."

FERTILIZER BORATE

more economical

FOR AGRICULTURE

Authorities have recognized that the depletion of Boron in soil has been reflected in limited production and poor quality of numerous field and fruit crops.

Outstanding results have been obtained with the application of Borax in specific quantities, or as part of the regular fertilizer mix, improving the quality and increasing the production of alfalfa and other legumes, table beets, sugar beets, apples, etc.

The work and recommendations of the State Agricultural Stations and County Agents are steadily increasing the recognition of the need for Boron in agriculture.

Boron is a plant food element and is commonly obtained from Borax since the element does not occur in the pure form. Fertilizer Borate is a semi-refined product containing 93% Borax.

Fertilizer Borate was placed on the market by the makers of "20 Mule Team Borax" as a fertilizer grade product to save cost of refining and hence to supply Borax at the lowest cost.

Fertilizer Borate is packed in 100 lb. sacks. Address your inquiries to the nearest office.

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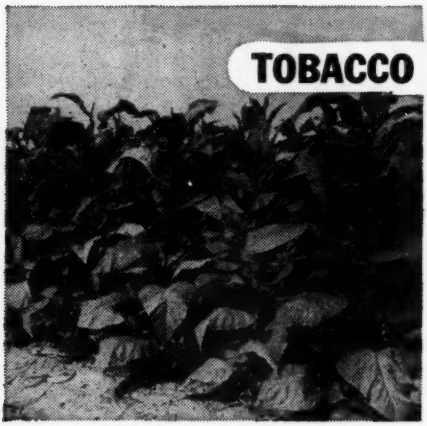
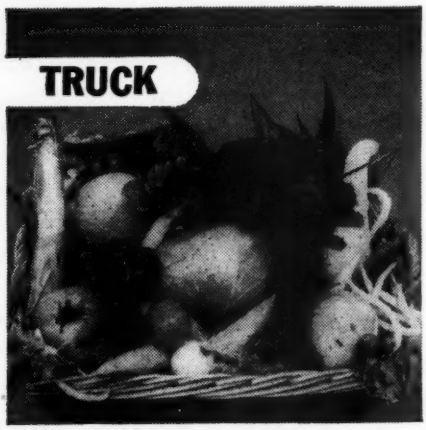


When you use V-C Tobacco Fertilizer, you can see the results of V-C's better plantfoods in bigger yields of better quality tobacco. In the plant bed, V-C grows hardier, healthier plants for early setting. In the field, you can see V-C in the health and vitality of your tobacco and in its resistance to disease and adverse weather. Center leaves, lugs and tips all have better texture. V-C produces broader, smoother leaf with excellent color, better body and more weight. You can see V-C in the higher prices you get for your tobacco on the warehouse floor.

When you use V-C Truck Fertilizer, you can see the results of V-C's better plantfoods in bigger yields of No. 1 vegetables that get top prices. These vegetables have the outside quality that appeals to the eye and the inside quality that pleases the taste and builds the health and vitality of the consumer. Vegetables grown with liberal amounts of V-C Truck Fertilizer are well-formed, fine-textured and take on a good finish. Such produce wilts less easily after picking, stands up under shipping and reaches the market in prime condition.



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